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COLLEGE INTERNATIONAL DES CHIRURGIENS

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Address[*]

THE finest attributes of true friendship are those deeper and lasting values which motivate one's consideration for others. The innate respect which lies deep in the heart of one man for another is the basic level from which springs true fraternalism. Among professional men the tie is made stronger by the daily grappling with problems shared by all because they arise from a common source, namely, disease in the human being.

Professional men are cognizant of an inherent defense mechanism which may be interpreted as jealousy. This may operate only on a level of interrelationship, but it pales like a puff of smoke when vicious propaganda is being promulgated against the society of which each is an integral part.

Life holds many rewards for those who search for them. Nature is redundant with glories which no artist can duplicate nor poet describe, yet they are visible to the eye of one who has the perceptive and esthetic sense to interpret and recognize them. Like the cryptogenic symptom, these beauties remain obscure until the perception of the sensitive individual reveals them. The abundant but hidden values which are present in the men and women who move in the same strata with us daily can furnish interest, pleasure and happiness if one would only pause to discern and recognize them.

Physicians by training develop an inquiring mind. They seek a material explanation for every phenomenon in health and disease and are content only when the answer satisfies. What can offer greater scope for study than the mysterious functions of the human body? Who can fathom the phenomenon of thought or what scientist can produce the velvety texture of human skin? Who can explain the priceless gift of vision or the mechanism of hearing? These attributes we accept, appropriate to our benefit and enjoy in an indifferent manner. Yet how much more they could mean to each of us would we but pause to reflect and evaluate the imponderable depths of their true significance as related to the mysterious processes of life.

One may wander far into the realm of science in search of the explanation of joy, sorrow, mirth; of mood, frown, smile; and one may become lost in wonder only to realize that the study of the science of life and disease offers limitless horizons for exploration by the analyst and intellectual adventurer.

Do we, I wonder, have the proper concept of the power of a smile? How it opens avenues to the sordid harboring place of malice, distrust and antipathy; how it has broken resistance, won friends, changed the course of decisions, melted animosity, rolled ba clouds of despondency and let the su replace gloom and revenge which can only insinuate, confuse and destroy. That person from whom has been withheld the ability to smile will find the road harder as he travels through life.

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[*] By Dr Herbert Acuff as president elect of the International College of Surgeons, at banquet given in his honor by the Knoxville Academy of Medicine, June 29, 1948, Knoxville, Tenn

Truly the temperament, the design and thoughts of an individual are reflected in physical expression and transmitted by an invisible force which, for the lack of a better name, has been called telepathy. Call this personality if you will, and I would insist that it is a fundamental and vital property of our physical being. Call it affectation if you will, but, in true sincerity, there is a demonstrable difference. Call it sinister or beguiling, and I would remind you that down through the centuries the leaders of men have not only possessed but have diligently cultivated the complexity of this strange phenomenon of personality persuasion, and have, by diligence, study and preparation, associated with this valuable attribute a convincing atmosphere as a most necessary complement.

I want to proclaim an abiding faith in the integrity of the physician and the solidarity of the medical profession, to encourage in them optimism, cheerfulness and assurance. Theirs has been the mission of preserving health, preventing disease and epidemics, and they are responsible for the enviable level of the extended span of life.

It is my opinion that the physician today for the most part believes in the progressive evolution of changing times and our inability to wreck the universe. He believes the world is a good one and strives to make it better. To him honesty is not a policy but an inherent component of his being. He prefers honor to wealth and will refuse to sacrifice the Hippocratic Oath to material gain. His efforts will be expended in true service and not for recognition alone. He moves with humility among men but with a confidence which adequate preparation assures.

He visualizes an ideal but will not lie, steal or compromise to attain it. He will never be daunted by reverses or failures because these he must accept as he daily meets the unstable realities of the human equation. Adversity will stabilize him, prosperity will encourage him. His conduct will be worthy of emulation as he travels, unwavering and steadfast, through the decades, to the attainment of his goal, ever keeping a high regard for his Creator and unswerving faith in the integrity of the human race.

Of course I speak with pride of having been chosen as President-Elect of the International College of Surgeons in Rome. This is all the more significant when one realizes that such an honor can come to only fifty men in a century. I am under no illusions as to the basic reason for such recognition and discount even the thought that any personal qualification of mine should have been responsible for such an enviable honor.

First, I regard it as a tribute to the great American profession and the universal respect it enjoys among the nations of the world. Many of these, no doubt, would have welcomed the Presidency to their own countries. Second, I feel deeply indebted to my many friends among the profession in the South, the United States Chapter of the International College of Surgeons, and to my own Knoxville Academy of Medicine for the opportunity to have served them and for whatever recognition my efforts may have received.

Finally, I must, and desire, to render to my loyal friend and co-worker, the founder of the International College of Surgeons, Dr. Max Thorek of Chicago, the major role in my election. His lofty position as a surgeon, author and humanitarian in the various countries of the world, commands the universal respect of the surgeons of those countries; and his ambition and altruism for the ideals of a world college for the advancement of surgery makes his sincerity of purpose a powerful and persuading influence. I am profoundly grateful to him, and shall cherish the privilege of working with him and the International Board of Trustees in the further promotion and expansion of a College whose scope and influence transcends the confines of any nation or country and extends the hand of surgical guidance and fraternity everywhere.

It is fitting that I should evaluate the place of the International College of Surgeons in relation to other great international organizations. The demand of the times is along international levels. There is an undeclared war between two opposing ideologies. On the one hand are the nations imbued with the ideals of free enterprise and democracy, and on the other those who follow the regimentation of totalitarianism Which of these shall survive depends upon the knowledge of the principles of democracies which the subjugated peoples may be permitted to learn Herein lies the challenge to America the chief successful example of true democracy

The voice of America must be simple and direct to the underprivileged populations Restriction of the dissemination of information to these peoples is a well organized part of totalitarian propaganda Medicine and surgery in Europe have suffered tremendously because of diversion of funds from science and research to the maintenance of military forces

The lack of a common language is a major handicap in reaching agreement on international issues It is highly necessary for more people to speak more languages or augment the movement which may eventually result in a common language which will be global in scope It is known that while there are records of 6760 languages in the world, only 2296 of them are actually spoken

English is now spoken by 220 million people, German by 90 million, Russian by 90 million, Spanish by 55 million, French and Italian by approximately 45 million each English is preferred not only because it is the language of the greatest number of people, but because of its extensive vocabulary The English language contains 455,000 words, the French language, roughly 400 000 words, the German language 150 000 words, the Russian language 140 000 words, the Italian language 140,000 words, and the Spanish language, 120,000 words These facts and figures are powerful factors when attempting to reach a basis of international understanding

World Wars I and II have brought together men of every type of business and professional interest from many countries of the world They have sought to establish business relationships, to maintain social contact with those various countries and to promote more friendly relationships which will augur strongly for the era of the world for permanent peace

The International College of Surgeons has followed in the wake of such a movement and is the result of a desire of surgeons from all over the world to fraternize and maintain contact with men of other countries whom they have known in war through travel and surgical writings To obtain such a relationship required the channeling and implementation of desires, friendships and professional exchange of ideas and methods on an international level

It was the further desire of many younger men to continue their postgraduate studies and to visit teaching institutions and hospitals in foreign countries Entrance to clinics without some form of introduction is not always easy

Thus the International College of Surgeons created a sort of College curriculum of two classifications Associate and Fellow, for the purpose of observing, guiding and assisting such men in their studies

Fellowship requires a most rigid examination together with practical demonstration of one's ability to perform acceptable surgery The standards of requirement for Fellowship in the various countries is the prerogative of the Executive Council in each country In the United States for example a Qualification Board determines the eligibility for Fellowship This Board is composed of respective examining boards in Surgery, Gynecology and Obstetrics Orthopedic Surgery, Proctology, Neurosurgery, Genito Urinary Surgery, Ophthalmo Oto Laryngoscopic Surgery, Laryngo Broncho Esophagoscopic Surgery, Thoracic Surgery These examining boards meet at stated intervals where examinations are given in two stages one comprises the basic sciences anatomy, pathology (microscopic and gross), bacteriology, physiology and biochemistry, with emphasis on the clinical application of these sciences, the other is an examination either oral, operative or both The results of such examining boards are filed for evaluation with the Qualification Board which, in turn, passes its findings and recommendations to the Executive Council for final disposition

The International College of Surgeons now has representation in forty five countries of the world and does not conceive its existence to be competitive with other existing surgical organizations. Its purpose is that of a teaching organization, carefully channeling the young surgeon from one classification to the other by careful scrutiny until he reaches the final stage when Fellowship may be conferred by successfully passing an examination, or who, in the case of the older and established surgeon, may be granted Fellowship by and with the approval of the Executive Council of the International College of Surgeons without examination.

It is the further purpose of the College to offer to surgeons who have qualified in their respective national organizations the right to apply for membership in the International organization, thus solidifying the prestige and power that comes with the coalition of constructive forces on an international level.

I am genuinely sincere in the belief that by desire and practice the physician incorporates the embodiment of kindness, interest, yearning and effort in the daily relationship with his patients. This desire to help leads his efforts into other constructive fields of public service until they find themselves amalgamated with all the civic and cultural movements of community life. This, in my humble interpretation of citizenship, is as it should be. No man has the selfish right to live in any community and withdraw from it all of the material wealth he is permitted to take and make no contribution in return.

The many fine qualities which I have all too inadequately enumerated as being inherent in the true physician are significantly demonstrated here tonight in your most generous recognition of my efforts in behalf of organized medicine and its colossal power as a medium for peace in the world.

I shall never know the words which could make you understand the gratitude I feel to each of you, for the friends who have honored me by coming from out of our city, and for the spirit which prompted them to come. Such an appreciation I feel but cannot express. Surprise—Yes! This occasion has been to me a glorious surprise!

Your magnanimous and cordial reception is a welcome which has eclipsed the most extravagant anticipation and is, I assure you, as deeply appreciated as its magnitude was to me incomprehensible. By this gracious act of kindness, coming as it does from my own intimate professional confreres, you have brought forth from within my being emotions which I have never known and a gratitude to each of you which shall serve to enrich the treasures in my memory throughout the challenging years which lie ahead.

For this expression of your appreciation and kindness I reply, in profound humility, with thanks, and dedicate myself and my efforts anew to the elevation of the standards of medicine and surgery in the world and to the full appreciation of continued association with men of science everywhere.

HERBERT ACUFF, M.D.

Neurinomas of the Gastrointestinal Tract*†

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NEURINOMAS are of infrequent occurrence in the stomach and intestines. Recognition of their early symptoms and knowledge of their further development are essential to successful treatment

INCIDENCE

As early as 1924 Gosset, Bertrand and Loevy, in their large comparative survey, collected 66 cases of stomach neurinomas, the majority being benign. The fact that Lagergren collected 14 cases in the last 10 years and that we also have had two cases at the Caroline Hospital since 1940 shows that they occur more frequently than is generally supposed.

Neurinomas rarely are found in the small intestine. Morison, of 13,139 cases examined, recorded 21 cases of tumors in the small intestine of which 13 were benign and 8 malignant. The former consisted of adenomas and neurinomas, and the latter of 4 carcinomas and 4 sarcomas. In 31,331 autopsies Sjovall found 70 cases of neurinoma or neurofibroma in different parts of the body, among which were 3 cases of neurinoma in the stomach and 2 in the small intestine. Collins published a review of 18 cases of neurinomas of the small intestine collected between 1929 and 1941. Few cases of neurinoma in the cecum, colon or rectum have been reported and, by comparison, those occurring in the small intestine are comparatively common. At the Caroline Hospital we have observed 3 cases of neurinoma in the small intestine since 1940. Incidentally, during the same period we had only 2 cases of carcinoma in the small intestine A further series of 6 cases of neurinoma in the small intestine was reported in Sweden at about the same time.

NOMENCLATURE

It is often difficult to classify these tumors pathologically Neurinomas, a term invented by Verocay in 1910, and similar tumors, are also referred to in the literature as neurilemmoma, argentaffinoma, schwannoma, plexiform sarcoma, fusosarcoma, etc. Consequently, there is reason to suspect that many cases of neurinoma pass under another name. The publications of Antoni, 1920, and Stout, 1935, have done much to introduce uniformity in terminology.

PATHOLOGY

These tumors in the alimentary tract are considered to take their origin in the plexus myentericus auerbachii or the submucous plexus. The tumor expands in every direction and, as a rule is strictly localized. It may develop beneath the mucous membrane encroaching on the lumen, or beneath the serous layer protruding into the peritoneal cavity. The larger tumors usually take the form of a big lobe encased in a fibrous membrane and consist of alternate firm and soft layers. A cross section frequently shows hemorrhage, cyst formation and necrosis

Histologically, they are typical differentiated tumors. Groups of cells with elongated nuclei often form a layer of palisade tissue or whorls. Surrounding the nuclei the cellular substance is partially made up of fibrillar structures. Increasing abnormality in the structure, cell and nuclear polymorphism and infiltrative growth in the contiguous tissues with their destruction are the signs signifying the onset of malignancy. Even in malignant tumors whorling arrangements and palisade formation may be found (Fig. 2). The neurinoma often shows what is known as "micropolycystic degeneration" As the small cysts increase in size and coalesce, larger and larger cavities will be formed within the tumor. Finally, there may be only one large degenerative cavity. This degeneration of the tumor tissue explains two of the complications characteristic of cases of neurinoma in the alimentary tract, that is, infection and frequent bleeding. When a large degenerative cavity develops in the tumor in the immediate neigh-

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* From the Caroline Hospital Surgical Clinic, Stockholm, Sweden

† Dr Cedermark was killed in an airplane crash, October 24 1947

TABLE 1. NEURINOMA OF THE STOMACH*

Case	Duration	Symptoms			X-ray	Preop. Diag.	Operation	Result
		Anorexia	Melena or Hematemesis	Anemia Hg %				
1	6 mo.	?	+	38	+	cancer	resec.	cured
2	?	+	—	—	+	cancer?	resec.	cured
3[1]	?	+	?	?	—	ulcer	resec.	cured
4	3 yrs.	+	+	22	+	cancer?	resec.	cured
5	2 yrs.	—	+	14	+	neurinoma	excis.	cured
6	9 yrs.	—	+	?	+	neurinoma	resec.	cured
7	1 yr.	—	+	?	+	?	enucleation	cured
8	1 yr.	+	+	?	+	cancer	resec.	cured
9	6 mo.	—	+	?	+	neurinoma	resec.	cured
10	several yrs.	+	+	?	+	ulcer	resec.	cured
11	2 yrs.	+	+	36	+	tumor	excis.	cured
12[2]	6 yrs.	—	—	37	—	anemia	no op.	died of anemia
13	10 yrs.	+	+	50	—	anemia	extirp.	cured
14[3]	2 wks	+	+	40	+	tumor	resec.	died
15	1 yr.	+	—	—	+	tumor	extirp.	cured
16	20 yrs.	+	?	?	+	tumor	resec.	cured

*Fourteen cases of Lagergren and 2 of the author's (15 and 16).

[1] Found by chance during operation for duodenal ulcer.

[2] Found at autopsy.

[3] Peritonitis after insufficiency of suture.

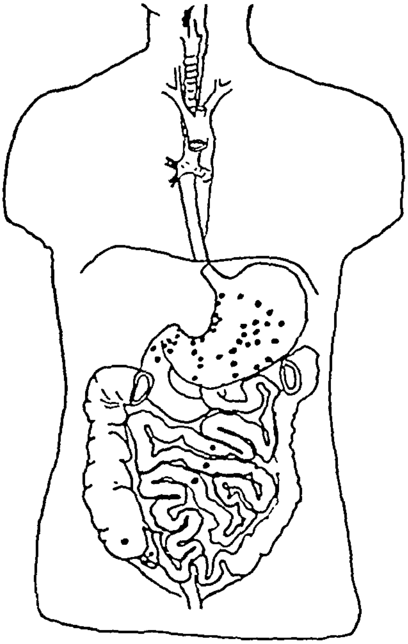

Fig. 1. Distribution of neurinomas in the gastrointestinal tract. (After Stout.)

borhood of the mucous membrane a perforation will often occur and sometimes as a result an infection. When a tumor develops beneath the peritoneum, which happens very infrequently, a perforation may result in a peritonitis. In addition these tumors, like other intestinal tumors, may produce an ileus in a purely mechanical way.

SYMPTOMS AND DIAGNOSIS

In Tables 1 and 2 I have tried to show the most important factors in the symptomatology and diagnosis of neurinoma in the gastrointestinal tract.

In Table 1 the first 14 cases are those reported by Lagergren. To these I have added 2 of my own (15, 16) from the Caroline Hospital. The history of symptoms is often of long duration. The dominating symptoms are anorexia with heartburn and nausea, and hematemesis or melena, often with considerable anemia. The tumor is generally diagnosed roentgenographically. The clinical diagnosis has been tumor, either benign or malignant.

TABLE 2. NEURINOMA OF THE SMALL INTESTINE*

Case	Duration	Symptoms				Preop Diag	Operation	Result
		Anorexia	Melena or Hematemesis	Anemia Hg %	X-ray			
1	13 yrs	+	+	55	—	cancer coli	resec.	died ½ yr., metastases
2	7 yrs.	+	+	34	—	melena	explor. lap 2x	died, metastases
3	8 yrs	—	+	45	—	inop pancreatic tumor	resec.	cured
4[1]	?	?	?	?	?	?	extirp	cured
5	3 yrs	—	+	33	—	tumor	resec	cured
6[2]	7 yrs	+	+	13	—	melena	resec	died
7	6 yrs.	+	+	40	—	pernicious anemia	resec.	cured
8[3]	2 yrs	+	+	35	—	ileus	resec.	postop. death
9[4]	11 days	perfor	peritonitis		—	periton	resec.	cured
10	?	+	+	+	—	tumor	resec	cured
11	?	—	—	—	—	tumor	resec	cured

*Cedermark, cases 1,2,3,4, Hedlund, case 5, Bager, cases 6,7; Nordlander, case 8, Sjovall, cases 9,10,11.

[1] Tumor found at time of operation for ileus

[2] Tumor found at autopsy

[3] *Malignant degeneration noted at autopsy*

[4] Died 3 years after operation, with metastases

In 3 cases (Cases 5, 6, 9) however, the diagnosis of neurinoma had been obtained before the operation, thanks to recognition of the symptoms by the clinician

In the series shown in Table 1 the patients were adults, aged from 42 to 82, and about equal frequency as to the sexes The size of the tumor has varied from cherry to orange size.

I have been particularly interested in neurinoma of the small intestine The collected cases are shown in Table 2

In diagnosis a history of symptoms of several years duration is important Vague digestive disturbances occur, but more obvious is a recurrent melena which produces a moderate or severe anemia In *no* case has it been possible to make a diagnosis with the help of x-rays, although a complete gastrointestinal series has been made in most of the cases. In Cases 1, 3, 10, and 11 (Table 2) the correct diagnosis was not suspected until the tumor could be felt The diagnosis and the treatment have often been instituted too late (Cases 1, 2, 6, 8, 9 in Table 2), although the symptoms

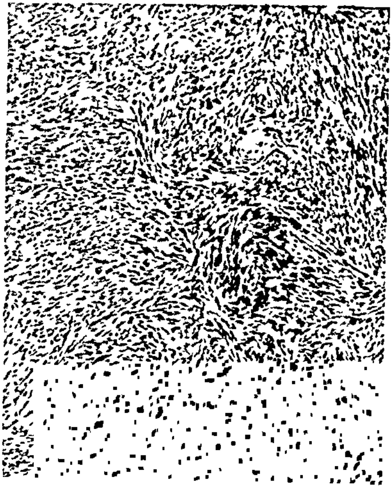

Fig. 2. Typical polymorphonuclear neurinoma with mitoses (genuine malignant tumor, Case 1). X75.

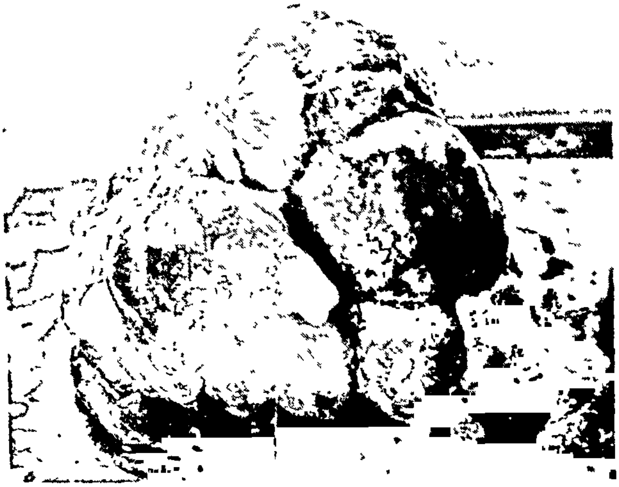

Fig. 3. Neurinoma in the small intestine with metastases, Case 1.

of the disease had been present for several years. In Hedlund's case a bleeding tumor in the small intestine was suspected because of melena and a laparotomy accordingly was performed.

In Case 6 (Table 2) operation had been performed on the stomach since it was believed to be the source of the hemorrhages. The intestinal tumor was found at autopsy. In one of my cases, two operations were performed on the stomach without discovering the cause of the hemorrhage.

In cases of neurinoma of the small intestine age and sex seem to have little bearing.

In size the tumors range from that of a hazel nut to that of a child's head.

It should be mentioned that neurinoma in the gastrointestinal tract may be mistaken for myoma clinically, pathologically and roentgenographically.

CASE REPORTS

The histories of my 4 cases of neurinoma in the small intestine are given below.

Case 1. Male, age 41 in 1930 when melena was observed. In 1931 ulcers were suspected and a gastroenterostomy was performed. Subsequently he was hospitalized several times for gastric disturbances and pronounced anemia. In 1937 he went to another hospital. Hemoglobin was 35 per cent. X-ray showed that his stomach emptied too rapidly. Another operation was performed in order to restore the normal outlet. In 1941 an x-ray of the stomach and colon was negative. No palpable resistance was present. Subsequently intestinal rumblings and flatulence developed and at this time the patient himself felt a rapidly growing tumor in the abdomen. He was sent to the surgical department of the Caroline Hospital on October 2, 1941, with the diagnosis of carcinoma with metastases.

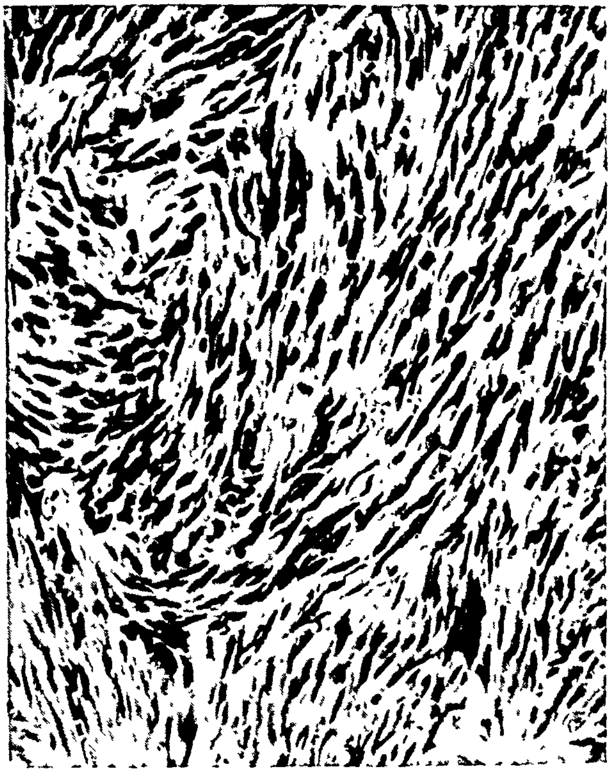

Fig. 4. Typical polymorphonuclear neurinoma with mitoses (genuine malignant tumor), Case 1. X280.

On examination the tumor was the size of an infant's head, quite movable, of firm consistency with a rather uneven surface. Slight sensitivity was present in the right upper quadrant. Hemoglobin was 60 per cent, red blood cells 4.6 million. Sedimentation rate 6 mm. Weber's test of feces was negative. Roentgenogram on October 12 showed that the tumor was situated between the midline and the colon ascendens, contained calcifications and seemed to have an irregular surface. The small intestine was pathologically distended.

At operation many adhesions from the previous operations were encountered. The tumor was larger than a child's head and multilobular. Part of it was soft, resembling brain tissue; part of it was firmer and richly vascularized. The tumor was found to take its origin from a loop in the upper part of the jejunum. When the large tumor was removed, many smaller ones were found at the base of the mesentery. These also were removed as completely as possible although it was obvious that the operation could not be a radical one. Pathologic

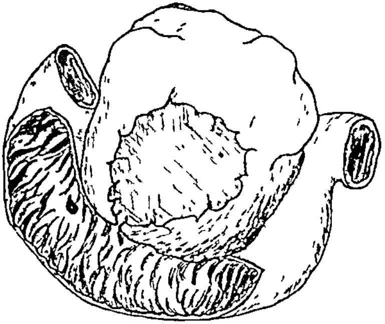

Fig 5 Schematic illustration of neurinoma in the duodenum Case 3

examination performed by Henschen and Reuterwall showed a tumor with many spindle shaped cells with, here and there, polymorphism, edema and necrosis There was also an area with less cellular and more fibrillar structure The nuclei showed there was a tendency toward palisade formation At one site the tumor had invaded and destroyed the mucosa Diagnosis Malignant neurinoma (also called neurilemmoma) with metastases in the tissues derived from the upper mesentery No lymphatic tissue was present (Figs 3 and 4)

A few weeks later two skin tumors were removed from the back These were proved to be lipomas without neurofibromatous elements Postoperative course was uneventful During the spring of 1943 recurrence of tumor with ascites occurred He lost weight rapidly and died later in the same year.

Case 2 Male, age 25 when first seen in 1939 He gave a history of gastric disturbances and melena and was hospitalized on several occasions for treatment of suspected ulcers There was no palpable resistance in the abdomen Hemoglobin was 34 per cent X rays showed nothing remarkable in the stomach or duodenum He was first treated in the medical department and later sent to the surgical division because no clear diagnosis could be made An exploratory laparotomy was performed on September 7, 1944 Nothing abnormal was demonstrated in the stomach or duodenum A more careful examination revealed a tumor the size of a mandarin orange and containing large blood vessels posterior to the pars descendens duodeni. A radical operation was intended but because of the size and position of the tumor it was only possible to take a biopsy specimen Healing was quite normal

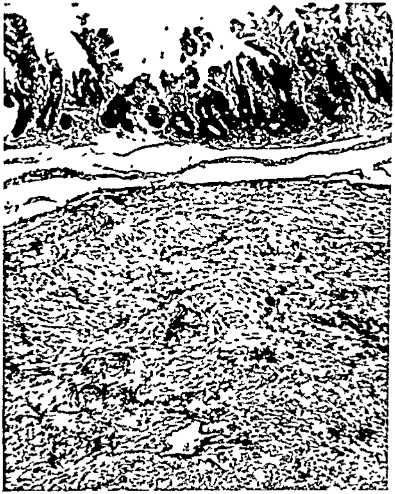

Fig 6 Typical sharply demarcated neurinoma Suspected signs of destructive growth in other parts Case 4 X60

Pathologic examination by Reuterwall showed that the neurinoma tissue was rich in cells and the nuclei in palisade formation in some areas Some nuclear hyperchromatism and a few mitoses were seen The tumor was surrounded by roughly laminated tissue Some parts of this tissue had been invaded and destroyed There were no certain signs of sarcoma but the microscopic picture showed local malignancy. Diagnosis Neurinoma

The patient was remitted to the medical department of the Caroline Hospital on November 10, 1945, for recurrent melena Hemoglobin, 35 per cent, sedimentation rate, 61 mm The liver was palpated 2 inches below the costal arcus In February, 1946, an exploratory laparotomy showed rounded tumors in the liver hilus A large and knotty nonresectable tumor was palpable through the duodenum He died in July, 1947.

Case 3 Female, age 53 when first seen in the surgical department of the Caroline Hospital in May, 1946 gave a history of anemia in 1938. She complained of general weakness, stinging and sensitivity on the right side of the abdomen since 1944 In February 1946 she had fainting fits, nausea, vomiting and discomfort after eating At that time she was seen in another hospital where her hemoglobin was found to be 45 per cent A tumor the size of an orange was palpable on the right side of the epigastrium. Stomach and duodenum revealed nothing abnormal. An exploratory laparotomy was performed on March 4 and a diagnosis was made of inoperable tumor of the pancreas. At the Caroline Hospital we found a resistant tumor the size of a fist to the right of the epigastrium. By x-ray the duodenum descendens was shown to be displaced to the left by a retroperitoneal tumor. The tumor showed no signs of growing into the duodenum.

Operation on June 20, 1946, revealed a retroperitoneal tumor larger than a fist, mainly situated posterior to the duodenum. Dilated blood vessels were observed over the tumor. The peritoneum was divided laterally and a quite sharply delimited tumor was found; it could be peeled away from the surrounding tissues to the point of its junction with the pars descendens duodeni.

A part of the duodenum was removed with the tumor. A lymph node the size of a fingertip was removed from the mesenterium near the tumor. In cross section the lumen of the duodenum was seen to communicate with a large cavity in the tumor which was necrotic (Fig. 5).

Pathologically the neurinoma seemed to have developed primarily from the muscularis; after partial necrosis it reached the muscularis mucosae and the mucous membrane of the duodenum. No indisputable evidence of malignancy was present but there were suspicious signs of destructive growth. The extirpated node showed no evidence of tumor elements. Diagnosis: Neurinoma. One year later the patient was well.

Case 4. In this male an operation was performed for ileus resulting from Meckel's diverticulum. At the time of operation a tumor the size of a hazelnut was found in the jejunum. The tumor was extirpated and was found to be a typical neurinoma which had not yet given rise to symptoms. Histologically, there was a suspicion of destructive growth (Fig. 6).

DISCUSSION

In my first three cases the process was of slow development. In the first case the diagnosis could be made only after 13 years, in the second, after 5 years, and in the third after 8 years. There is reason to suppose that in the first the tumor was benign at its inception, later becoming malignant and giving rise to metastases. This was true of the second also. This is remarkable because neurinomas as a rule are benign and very seldom give rise to metastases. In the third case the tumor was practically benign, but because of its tendency to necrosis it had given rise to serious symptoms. The fourth had not yet caused symptoms.

Judging from these and other published cases of neurinoma of the small intestine, benign as well as malignant, melena is a suggestive symptom. Peritonitis may arise from the perforation of the necrotic cavity into the peritoneal cavity, or the tumor may cause ileus.

SUMMARY

In neurinoma of the stomach or small intestine, the symptoms often take the form of repeated bleeding. When situated in the stomach the tumor can often be diagnosed by x-ray. This has not been the rule in cases of neurinoma in the small intestine. In cases of occult melena a definite diagnosis can be made only by an exploratory laparotomy.

Even if the neurinoma of the stomach or small intestine is benign it may give rise to dangerous complications such as anemia, peritonitis or ileus, and a neurinoma which begins as a benign one may later become malignant.

If the tumor is removed as soon as possible by extirpation or resection, quite a good prognosis can, as a rule, be given.

RIASSUNTO

Neurinomi dello stomaco e dell'intestino tenue offrono quale sintomo caratteristico emorragie ripetute. Quando localizzati nello stomaco, vengono spesso scoperti all'indagine radiografica. Sfuggono invece per lo piu' i neurinomi dell'intestino. Nei casi di melena occulto, la diagnosi puo' essere stabilita solo in base ad una laparatomia esplorativa.

SUMARIO

En neurinomas del estomago e intestino delgado, uno de los sintomas mas comunes es la hemorragia frecuente. Cuando el tumor esta localizado en el estomago se puede con frecuencia visualizar por los rayos-X. no asi los del intestino delgado. En casos de melena oculta el diagnostico definitivo solo puede hacerse con la laparatomia exploradora.

SOMMAIRE

Dans les névromes de l'estomac ainsi que dans ceux de l'intestin grêle, les symptomes se manifestent par des hemorragies répétées Si la tumeur est située dans l'estomac, le diagnostique peut être fait par les rayons "X" Cela n'a pas ete la règle dans les nevromes de *l'intestin grêle Dans les cas* de méléna occulte, un diagnostique précis ne peut être fait qu'au moyen d'une laparatomie explorative

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Diasone as an Adjunct in the Treatment of Tuberculosis of Bones and Joints in Children[*][†]

LEE M. CATTELL, JR., M.D.
TAMPA, FLA.

WITH the revival of interest in chemotherapeutic agents caused by the development of the sulfanilamides, it was only a matter of time before preparations recommended for treatment of tuberculosis became available. To date, three compounds have had their advocates: promin, diasone, and promizole. Discussion here will be limited to diasone.

Diasone (disodium formaldehyde sulfoxylate diaminodiphenylsulfone) was synthesized in 1937 by Raiziss[1] in the investigation of preparations related to 4, 4′ diaminodiphenylsulfone, a compound with high experimental therapeutic effectiveness in tuberculous infections of guinea pigs. Callomon[2] was first to test the therapeutic effect of diasone in tuberculous guinea pigs. His excellent results were confirmed six months later by Feldman, Hinshaw, and Moses.[3] In guinea pigs Raiziss[4] has shown that the acute and chronic toxic levels of diasone are several times higher than the therapeutic levels.

The first report of human pulmonary tuberculosis treated with diasone was published by Petter and Prenzlau[5] in April, 1944. In their study which covers a period of eight months they also report 7 cases of bone and joint tuberculosis, 5 of which were treated longer than 60 days with diasone. At the time their report was published, one case was considered worse and 4 were improved. These patients were all adults on a daily dosage of 1.0 Gm. by mouth per day in divided doses. Blood levels were 1.5 mg. per cent or above (therapeutic level in guinea pigs was 1.5 mg. per cent). Shortly thereafter, additional reports began to appear, which were all less optimistic. Hinshaw *et al.*,[6] Benson *et al.*[7] ("diasone has not been very promising"), and Olson *et al.*[10] ("diasone did not influence a change over bed rest alone"), concurred in the opinion that diasone was of questionable value in the treatment of pulmonary tuberculosis.

One fatal pemphigoid reaction to diasone was reported by Robitzek[8] in 1945, following administration of the drug for 26 days. Petter[9] reiterated his previous views in 1945, stating that "most exudative pulmonary lesions respond favorably," and that "80 per cent of extrapulmonary lesions have shown improvement" (when treated with diasone alone).

It is against this background that these 18 cases of bone and joint tuberculosis in children, in which diasone was used as an adjunct to the "conventional" treatment, are presented.

TREATMENT

This report covers patients treated in the Children's Memorial Hospital from May 1, 1944, through October 15, 1946. All patients with suspected bone and joint tuberculosis were hospitalized and examined in the following respects: a complete history and physical examination; routine blood and urinalysis; photographs of the involved part; x-rays of the involved part, together with a chest x-ray; sputum examination, with culture on appropriate media; culture of a clean urine specimen on appropriate media; Mantoux tests were administered to all patients; and determinations were made of sedimentation rate.

The diagnosis of bone and joint tuberculosis was made following a positive report from an aspiration of the involved joint, biopsy of the involved joint, or examination of specimens obtained at the time of surgery. A positive report from any of these examinations confirmed the presence of a tuberculous infection. Tuberculosis of the spine was diagnosed by clinical findings, including roentgenograms.

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[*] From the Orthopedic Service of Dr. Edward L. Compere, Children's Memorial Hospital, Chicago, Ill.

[†] The Diasone used in this investigation was supplied through the courtesy of the Abbott Laboratories, North Chicago, Ill.

Ward care consisted of fresh air, adequate diet, bed rest, and splinting as indicated The diet was supplemented with cod liver oil vitamin C, and brewer's yeast, frequent small blood transfusions also were administered Thus diasone was used as an *adjunct* and not as a specific treatment for tuberculosis of the bones and joints It was administered either b i d or t i d with bicarbonate of soda, and the maximum tolerated dose of diasone was given If cyanosis of the skin was noted the dosage was decreased There was usually an initial drop in red blood cell count, but this was corrected by the small blood transfusions Surgical ankylosis of the involved joint was performed when the condition of the patient was found to be satisfactory

CASE REPORTS

Case 1 J M, male, born Apr 25, 1935, admitted to the hospital Mar 10, 1944 with tuberculosis of the right knee Diasone in doses of 2½ gr t i d was administered in three courses of six months each Biopsy specimens Aug 22, 1944, and in October, 1946, showed that a very lowgrade synovitis was still present The sedimentation rate was normal, the patient was nonweight bearing, but gaining weight satisfactorily

Case 2 D D, female, born Aug 5, 1934, admitted to hospital Apr 14, 1944 with tuberculosis of the left knee Diasone, 2 gr t i d, was administered for two courses of six months Knee fusion on Dec 12, 1944 was followed by drainage for seven months Following the second course of diasone therapy, the drainage stopped In October, 1946, the knee was solid, the sedimentation rate was normal, and the patient was gaining weight

Case 3 A S, male, born Dec 29, 1934 admitted to hospital May 22, 1940 with tuberculosis of the right hip Received one course of diasone therapy, 3½ gr t i d On Nov 19, 1940 an intra and extraarticular hip fusion was done, and on Dec 5 1944 a sinus was removed surgically, with prompt healing In October, 1946, sedimentation rate was normal, and the fusion was solid

Case 4 R W, male, born Aug 12 1943, admitted to hospital June 14, 1945 with tuberculosis of the right elbow, the thoracic spine, and pulmonary tuberculosis The patient received 1 gr b i d of diasone for three months following admission to hospital, and on July 24, 1945 a spinal fusion was done, and the patient transferred to another hospital He died Sept 30, 1946, and an autopsy revealed miliary tuberculosis

Case 5 C S, male, born Aug 15, 1934, admitted to hospital May 19, 1939 with tuberculosis of the left hip Received 1 gr t i d of diasone for six months, and on Apr 20, 1940 had an extraarticular hip fusion On Feb 6 1945 he had a re fusion and femoral osteotomy In October, 1946 the fusion and osteotomy were solid, and the sedimentation rate was normal

Case 6 G G, female, born Feb 15 1941, admitted to hospital Mar 1, 1944 with tuberculosis of the tonsils and the right hip Received one course of diasone, ¾ gr t i d and on Feb 11 1946 had a tonsillectomy, and two months later had an intra and extraarticular hip fusion The patient was still in a spica cast in October, 1946

Case 7 R K, male, born Feb 9, 1942, admitted to hospital on Aug 3, 1945 with tuberculosis of the left hip Received 1 gr b i d of diasone for six months On Apr 30, 1946 an intra and extraarticular hip fusion was performed, and in October, 1946, the patient was still in a cast, with a normal sedimentation rate

Case 8 A G, female born Jan 27, 1942, admitted to hospital Apr 20, 1944 with tuberculosis of the tonsils and the left knee Received two courses of diasone therapy, six months each, receiving ¾ gr b i d Had a tonsillectomy on Nov 16, 1945, and had a biopsy of the left knee on Jan 5, 1946 There was a lowgrade synovitis still present in October, 1946, the sedimentation rate was just below normal, and the patient was still under treatment

Case 9 K B female, born June 12, 1942, admitted to hospital on Jan 4, 1945 with tuberculosis of the left hip Received one six months course of diasone therapy, receiving ¾ gr b i d On Oct 23, 1945 an intra and extraarticular hip fusion was performed and the patient was still in a cast in October, 1946 Sedimentation rate was normal

Case 10 S W, female, born Aug 20, 1938, admitted to hospital Jan 2, 1940 with tuberculosis of the left elbow and the right hip Received ¾ gr t i d of diasone for eight months On Jan 5, 1943 had an extraarticular hip fusion On Mar 28, 1943 had an intra and extraarticular hip fusion, and on Mar 15 1945 an intra and extraarticular hip fusion A draining sinus of 1½ years duration healed after the course of diasone therapy. The patient was still in a cast in October, 1946.

Case 11. J. G., male, born Oct. 12, 1942, admitted to hospital Feb. 22, 1945 with tuberculosis of the right hip. Received one course of diasone therapy, receiving ¾ gr. b.i.d. On Oct. 16, 1945 an intra- and extraarticular hip fusion was performed; a draining sinus persisted, however, until June 1, 1946. The patient was still in a spica cast in October, 1946. Condition was good, and sedimentation rate was normal.

Case 12. K. B., male, born May 14, 1941, admitted to hospital Dec. 13, 1943 with tuberculosis of the right ankle, and suspected tuberculosis of the right hip. Received ¾ gr. t.i.d. of diasone for one course of six months. On Mar. 7, 1944 had an ankle fusion, using a sliding bone graft, and on Apr. 22, 1946 there was involvement of the right hip. Immediately following this the patient was lost to the clinic, and no further notes on the case are available. The fusion of the ankle was solid, however, at that time.

Case 13. J. W., male, born Sept. 4, 1940, admitted to hospital Jan. 25, 1943 with tuberculosis of the left femoral metaphysis. Received ¾ gr. t.i.d. of diasone for one year. On Mar. 9, 1943 the cavity was curetted and packed with bone chips. The patient had had intermittent drainage since his admission to the hospital, and there was only a very slow improvement in this case.

Case 14. N. N., female, born Dec. 26, 1937, admitted to hospital Apr. 22, 1940 with tuberculosis of the eighth thoracic vertebra, the right ilium, and the third metacarpal of the right hand. Received 1 gr. t.i.d. of diasone for three months. On June 25, 1940 a Hibbs spinal fusion was performed, on Jan. 27, 1942 a refusion of the spine was done, and on July 16, 1945 an intra- and extraarticular hip fusion was performed. The patient was still in a spica cast in October, 1946, and gaining weight, with a normal sedimentation rate.

Case 15. J. T., male, born Dec. 30, 1940, admitted to hospital Mar. 14, 1944 with tuberculosis of the lumbar spine. Received ¾ gr. t.i.d. of diasone for 10 months, and on Apr. 29, 1944 had a spinal fusion. On Mar. 13, 1945 had a refusion, and in October, 1946, was making good progress, gaining weight with a normal sedimentation rate.

Case 16. P. T., male, born Sept. 29, 1944, admitted to hospital Apr. 26, 1945 with tuberculosis of the left wrist. Received 1 gr. of diasone per day in the formula for six months. Drainage spontaneously stopped on Sept. 1, 1945, and in October, 1946, was apparently healed, with normal sedimentation rate. No surgery was performed.

Case 17. M. F., female, born July 17, 1941, admitted to hospital Nov. 21, 1944 with tuberculosis of the fourth and fifth thoracic vertebrae, and tuberculosis of the left hip. Received a three months course of diasone, ¾ gr. t.i.d. On Apr. 3, 1945 a spinal fusion was done, and the patient expired May 3, 1945 from miliary tuberculosis.

Case 18. B. K., female, born Oct. 1, 1942, admitted to hospital Feb. 21, 1945 with Potts' paraplegia and tuberculosis of the eighth, ninth and tenth thoracic vertebrae. Received ¾ gr. b.i.d. of diasone for 11 months, and on May 28, 1946 underwent a spinal fusion. In October, 1946, the paraplegia was very slowly regressing, and the general condition was considered satisfactory.

SUMMARY

In the 18 cases treated with diasone as an adjunct, there were two fatalities (Cases 4 and 17), or 11 per cent.

During the course of diasone administration, three long-standing chronic draining tuberculous sinuses were healed (Cases 2, 3, and 10). In Case 11, a draining sinus failed to heal. Tuberculous involvement of a hip was recognized shortly after beginning diasone therapy in Case 12. Case 13 had not gained weight from March, 1943, to January, 1945, but did gain nine pounds during the next year while diasone was being administered.

There were no control cases, and no definite conclusions are possible. Most of these patients showed improvement when diasone was administered, as indicated by better appetites, gain in weight, and drop in sedimentation rate.

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Prevention of Amputation Neuroma*

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THE painful stump following amputation has been one of the most perplexing clinical problems engaging the attention of surgeons. This type of pain occurs very frequently. In our experience it is present in almost 30 per cent of cases, though a wide range of incidence is quoted by other investigators. Hermann and Gibbs[2] report an incidence of 6 per cent, whereas Sliosberg[7] gave 72 per cent. Other figures are reported between these extremes. These conspicuous differences are due first to the judgment of the individual observer; second, to the affections determining the amputation; third, to the method of healing. Thus, if amputations are done under emergency conditions, as in war, because of inflammation and infection, and in which the succeeding treatment of the surgical wound is by the open method in the presence of infection, it is certain that the possibilities of a painful stump developing will be greater than after amputations performed electively in peacetime. Other factors of importance are the amputation technic and the method used in handling the nerve stump.

The most frequent causes of painful stumps are of nervous origin and these will be discussed, leaving out of consideration those painful stumps due to infection, osteophytes, sensitive scars and so on.

Where pain is of nervous origin amputation neuroma is most often the cause, though cases may be seen in which the clinical manifestations appear to be of sympathetic or central origin. The amputation neuroma develops a few days after the operation at the terminal part of the nerve stump. It is club-shaped, of cicatricial aspect, grayish in color, and histologically consists of nerve fibers generated from the ends of the neurofibrils. They take an irregular course and are often loop-shaped in the direction of the nerve trunk. These neurofibrils are contained in, and severely compressed and strangled by, the abundant connective tissue which rapidly develops into a dense scar. The amputation neuroma can develop from any nerve; but especially from the main large nerves. In stumps which heal by second intention, or in which infection has been present for some time, the amputation neuromas are included in the cicatricial tissue of the stump and cannot be easily distinguished; sometimes they adhere to the terminal part of the bone stump. It is now certain that painful stumps are most frequently of the type which present the latter characteristics.

The pathologic interpretation of pain due to amputation neuromas is very difficult, because we have not yet sufficient elements to explain the essential mechanism of the residual function of a severed nerve. The fundamental function of nervous transmission is still maintained, even if it becomes reduced after some time. It is also certain that through the ends of the neurofibrils proliferated in the cicatricial connective tissue, stimuli can be picked up and transmitted through the sensory fibers to the brain center where they are perceived as pain and evoke the reflex arc with tonic and clonic muscular contractions of the stump.

The changes which take place at the site of the amputation neuroma are identical with those observed when whole or portions of sensory nerves are enclosed and compressed in cicatricial tissue at any level of their course and in which pain is the most important symptom accompanied by trophic and sympathetic symptoms.

According to the rule, all stimuli are collected by the terminal plaques and conveyed by way of the nerves to the brain center. Many sensory nerve endings are distributed to the muscles which therefore are richly supplied with a double innervation, sensory and motor. This does not occur at the junction of the neurofibrils with the amputation neuroma which, being cicatricial tissue, is not a favorable medium. The scar of the amputation neuroma becomes the starting point of stimuli which probably pass the threshold of normal sensibility and therefore are collected in the brain center as painful sensations. These stimuli from the neuroma are emphasized by stimuli coming from the stump scar when the neuroma is enclosed in the latter. It is known that the sensory and motor nerves also contain sympathetic fibers, but their density in cases of amputation neuroma is not yet well known; they probably become the starting point of stimuli which through a reflex are manifest through symptoms of trophic and sympathetic disorders

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There have been numerous attempts to prevent the formation of amputation neuroma The method employed by Ritter, Bier, Bardenheuer and others failed because it did not prevent the formation of neuroma. The end-to-end anastomosis of two sectioned nerves proposed by Leriche and Fontaine [3] also gave unsatisfactory results and had to be abandoned Refrigeration of the nerve with solid carbon dioxide as practiced by Laewen, section of the nerve by thermocautery according to Hedri, and injection of the nerve stump with alcohol, formol, etc., have been of no ultimate value. Better results have been obtained by Poth and Bravo Fernandez [6] with multiple injections into the nerve stump of 10 per cent solution of tannic acid or 2 per cent solution of gentian violet. These solutions inhibit the rapid production of the neurofibrils and the formation of the neuroma. Relatively good results have been obtained by Hermann and Gibbs with ligation of the nerve stump with nonabsorbable material, especially steel thread. The neuroma does not develop because the perineurium surrounds the neurofibrils which are strangled by the steel thread, thus inhibiting their growth. Dogliotti, White,[9] and Boldrey and Edwin [1] implanted the principal nerve into the bone marrow through a canal running into the cortex or into the bone, to inhibit the formation of amputation neuroma or at least to assure its formation at some distance from the terminal cicatrix of the amputated limb. None of these methods nor others not worth mentioning have achieved the purpose of preventing the formation of amputation neuroma. Even if a typical neuroma apparently is developed the endings of the neurofibrils are in contact with the fibrous cicatricial tissue even if in small proportion, and it is certain that it represents the cause of stimuli which are transmitted to the brain center through the nerve trunk. Therefore, clinical results with these methods have been inconstant and there have been many clinical failures.

It is my opinion that the solution to this problem lies in a physiologic approach. Connective tissue is not a favorable medium for the proliferation of neurofibrils from the stump of the severed nerve. On the other hand, muscle tissue, normally richly supplied with nerve endings, may reasonably be considered as representing the most favorable medium to harbor the proliferated neurofibrils Moskowicz [5] in 1918 treated two cases of painful stumps by resection of the amputation neuroma, ligation of the nerve and suture of it to the muscle; the nerve stump was grafted into a nearby muscle, apparently with good results. The technic he used is quite different from mine, and he offered no histologic results but thought he could prevent the formation of amputation neuroma with his method. With this object in mind, and in collaboration with Rosso, I undertook experimental studies with rabbits. The principal nerves were placed unsutured between muscle fibers adjacent to the amputation site (Fig. 1), these fibers having been separated for a few millimeters for this purpose. Results of these experiments have always been good and with this method of disposing of the nerve stump the formation of amputation neuroma has always been prevented.

Serial sections were made of the implanted nerve stump and the muscle host, using Cajal's method (second formula) 6, 25, 40, 60, 75, 100 and 110 days after the operation. Within 10 days the nerve stump is securely attached to the muscle at the site of implantation. At first this attachment is caused by cicatricial tissue formed between perineurium and the muscle connective tissue, while later a more intimate attachment is effected by the proliferation of the neurofibrils in the muscle.

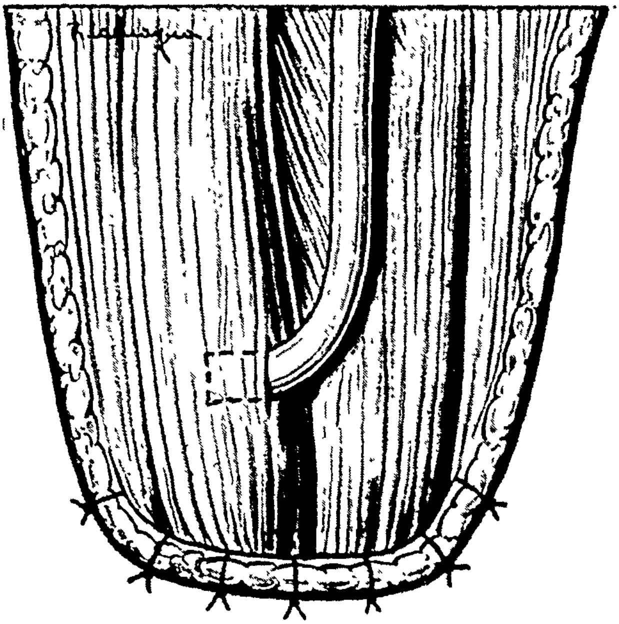

Fig. 1. Graft of a nerve stump in a near muscle in order to prevent the formation of an amputation neuroma.

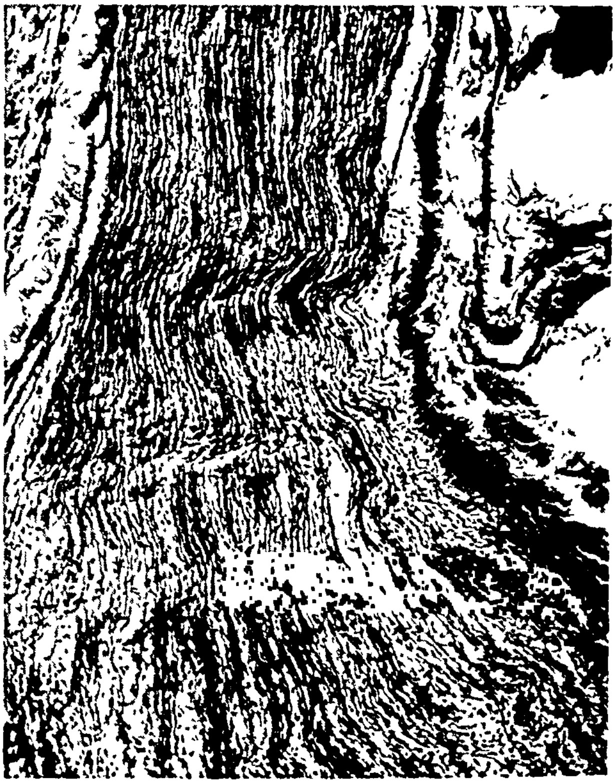

Fig. 2. Photomicrograph of the grafting zone of central stump of the external popliteal sciatic into the gastrocnemius muscle; 75 days after operation cicatricial tissue between perineurium and the muscle. Slight proliferation of loose connective tissue at the section surface of the nerve which is penetrated by proliferated neurofibrils in a straight line toward the muscular fibers. No twisting of characteristic neurofibrils of the amputation stump. (Magnification not stated.)

At the sectioned surface of the nerve, beginning with the twenty-fifth day, a narrow zone of loose cicatricial tissue is penetrated in all directions by the neurofibrils proliferating from the nerve stump (Fig. 2). These take a course following the muscle fibers. Later, the neurofibrils which were first united in little groups of 25 to 40 at a distance of almost ½ cm. from the end of the severed nerve tend to separate into smaller fasciculi containing 8 to 10 neurofibrils, then 3 to 5 and less. These nerve fasciculi first filter into the muscle fasciculi and then, taking a parallel course between the muscle fibers, creep between the loose connective and interfibrillar tissue. From 65 to 70 days after amputation the fasciculi of neurofibrils separate, approach the muscle fibers singly and end upon them firmly attached. Corresponding to these developments there is no trace of connective tissue proliferation.

The neurofibrils vary in size, ranging from very large to small. The attachments of the neurofibrils on the muscle fibers are club-form, very thin, or bifid. Some neurofibrils connect with the muscle fibers earlier, while most of them penetrate 10 to 12 mm. into the muscle. To avoid errors caused by the confusion between the neurofibrils of the implanted nerve and the normal neurofibrils of the muscle, only those serial sections were considered in which the neurofibrils of the implanted nerve could be followed through the entire course from the section of the implanted nerve to the point where the fibrils end on the muscle fibers (Figs. 3 and 4).

With this method not only is formation of amputation neuroma and the terminal cicatrix prevented, but the neurofibrils pick up physiologic connections with the muscle fibers to which they are intimately attached. Grafting mixed nerves into muscles, with neurofibrils ending upon the muscle fibers, has resulted in connecting motor and sensory fibers

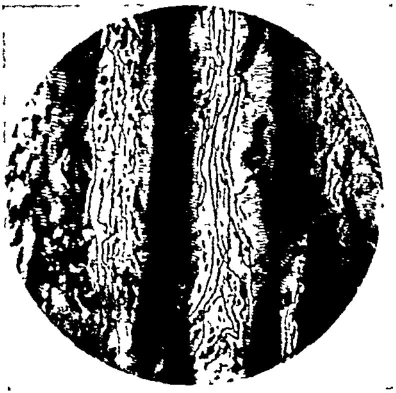

Fig 3 Photomicrograph of enlarged muscle zone in which the neurofibrils are proliferated 100 days after operation The neurofibrils, 3 to 5 or more, are infiltrating the interfibrillar connective tissue without reaction, and are reaching separately the muscular fibers on which they end (Magnification not stated)

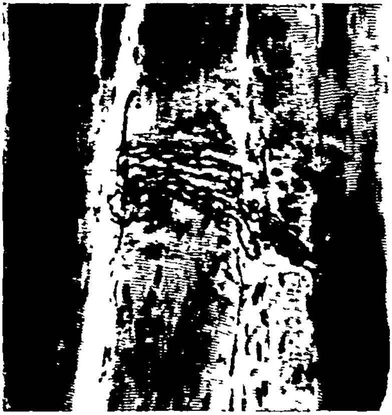

Fig 4 Ending of a bundle of neurofibrils on a muscular fiber The neurofibrils coil around the muscular fiber and mostly end as a clava Photomicrograph at enlarged zone 110 days after operation (Magnification not stated)

with the muscle tissue. This fact demonstrates that the muscle fibers exert an elective tropism on the neurofibrils without distinction of functional, central or peripheral nature. We cannot exclude the possibility that sympathetic neurofibrils, which are a part of the severed nerve, also end upon the muscle fibers The presence in muscles of neurofibrils of large and uniform diameter and of smaller neurofibrils seems to confirm this point of view

CONCLUSIONS

With the implanting of an amputation nerve stump into nearby muscles we believe we have solved the problem of amputation neuroma The proliferation of the neurofibrils of the severed nerves takes place in tissue which, anatomically and physiologically, is exactly the same or very similar to that in which the nerve endings of the amputated nerve were normally situated. It is of the greatest importance that the proliferating neurofibrils be able to proceed, without interference or reactive proliferation of intermuscular connective tissue which remains indifferent to their passage, from the sectioned surface of the nerve to the point where they take up solid connections with the muscle fibers

This method has been used in six cases of elective amputation at the lower third or midthigh. The sciatic nerve was implanted into the body of an adjacent muscle, usually the biceps femoris During the immediate postoperative period and in controls 6 to 8 months after amputation, the stumps in all were painless and the patients had the illusive sensation of the presence of the amputated limb This sensation was very reduced. In one case with a painful thigh stump the neuroma was resected and the severed nerve stump implanted into a nearby muscle, with complete recovery

Although these cases are few they suggest that clinically this method may prevent the development of amputation neuroma Since according to most statistics painful stumps occur in more than one-third of amputation cases it would seem reasonable to give the method a trial.

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Arthrogryposis*

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THE term arthrogryposis implies a deformity which is essentially produced by distortion of a number of joints of the body It seems that the first to refer to this condition was Otto in 1841, but only very scant mention was made of it in the following decades Interest in the condition rose again toward the end of the last century when Redard, Kirmisson and others reported a number of cases in 1892 and 1893 Further contributions were made in the French literature by Phocas and Trident between 1899 and 1907 so that in 1905 Rosenkranz was able to collect 56 cases in the literature

Reports in American literature are rather meager Stern described 4 cases in 1923 and Lewin 2 more in 1925 In all these contributions however, no opinion was given as to the real cause of the deformity although various theories were set forth

PATHOLOGY

The early observers had little to say concerning the pathologic nature of this condition except for the description of multiple joint contractures The outstanding fact is that there is no bone aplasia even though the joint contractures may be associated with other deformities such as clubfeet, clubhands or congenital dislocations It seems in this deformity primary germinal variation cannot be considered the responsible factor Since the formation of the skeletal system occurs approximately at the same time with that of the nerves and muscles it would be rather hard to conceive a causative agency operating at the time of muscle and nerve development which would leave the skeleton entirely intact Earlier reports of Otto hinted at a malformation of the soft tissues alone, and he himself called the condition a congenital myodystrophy, an idea which was shared by many other observers It was D H Middleton who in 1943 described the pathology of this condition to which he gave the name myodystrophia fetalis deformans Middleton found the muscles degenerated into fatty tissue and fibrous strands which contained only scant remnants of muscle fibers There are irregular areas of the normal muscle fibers however interwoven with fat and connective tissue, and the aggregation of fat as well as the gross degeneration of remaining muscle fibers seem to be the main feature In so far as the muscle fibers themselves are preserved they appear grossly attenuated though one can see areas of normal muscle fibers in their midst Some fields will show complete absence of muscle fibers, however, and complete fibrous and fatty transformation This type of degeneration strongly resembles the pictures seen in the myodystrophies of later years The weight of evidence is against this muscle degeneration being secondary to a lower motor neuron paralysis, it points rather to a primary muscle degeneration It seems that these changes occur late in embryonal life when the muscle fibers are already differentiated

In accord with this we also find responses to faradic current weak or absent and there is no reaction of degeneration which shows again that the muscle atrophy is not of peripheral nerve origin, but rather indicates hypoplasia or complete absence of the muscle

From the rigidity of the contractures it would seem that for obstacles to correction of position one must look beyond the degenerative atrophy of the muscle These obstacles consist in secondary shrinkage of the capsular apparatus The skeleton itself is only indirectly involved, namely, when secondary deformities of the bone have developed from persistent contractures

ETIOLOGY

A number of theories have been advanced particularly that related to the effect of amniotic pressure upon the development of this deformity, but there is no convincing evidence at hand that intrauterine compression plays a part. Oligamnios was found only in a minority of cases and most of the siblings born of mothers with constitutional oligamnios were found to be unaffected. The question has also been raised whether the muscle changes are really the primary factor of the deformity or whether they are secondary to the primary malformation of the articulation. There is no evidence pointing to the latter event, and we must say that on the whole the etiology of the condition is entirely unsettled except that we can assume that it is not due to a primary germinal variation affecting the development of the skeletal system.

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* Read before the Twelfth National Assembly United States Chapter International College of Surgeons Chicago Sept 29 Oct 4 1947

CLINICAL PATHOLOGY

Deformity prevails in males at the ratio of 15:7. Children show general clinical stigmata consisting mainly in associative deformities such as genu valgum, equinovarus, and claw toes. The bones show a certain degree of osteodystrophy, sometimes with shortening of the limbs. The particular feature is the hypertrophy of the subcutaneous fat as well as the generalized muscular atrophy which seems very much in contrast to the rigid contracture position.

The outstanding symptom is the rigidity of one or more joints, but it never gives the impression of an absolute block. The contracture is always springy, no matter how greatly the motion may be restricted.

In the x-ray picture there are no gross abnormalities, and the outline of the muscle masses can be made out. There seems to be a perfect relationship between the severity of the contractures and the degree of muscular degenerative changes.

In general, two large groups can be distinguished, namely, those in which the limbs are contracted in extension and those in which they are contracted in flexion. On the basis of 60 cases under our observation we would suggest the following classification.

1. Extension contractures.

a. Quadrupedal, involving elbows and knees with other joints involved in the form of clubfeet or symmetrical dislocation of the hip.

b. Bimelic where both knees or both elbows are involved either in extension or in flexion.

c. Monomelic, involving one limb only.

2. Flexion contractures, to be divided similarly into (a) quadrupedal, symmetrical involvement of hips, knees, elbows, shoulders, wrists, etc.

b. Bimelic, involving the knees with associative deformities of wrist and feet.

3. Mixed contractures in which extension contractures of the uppers, for instance, are combined with flexion contractures of the lowers.

a. Extension contractures. The elbows are in extension, the forearms are pronated, knees in extension or hyperextension. The shoulders are held in adduction. Atrophy of the deltoid and pectoralis muscles is present. Passive reduction is possible but active reduction is restricted. The elbows are held in extension at a more or less straight angle or in a few degrees of flexion. The forearm is in pronation, and the wrist slightly flexed. In the lower extremity there is extension contracture of the knees, rigidity of the hip, with the feet usually in equinovarus position. The extended knees show all degrees of deformity from straight extension to extreme genu recurvatum so that the toes point upward and the patient is actually walking on the calf of his leg.

b. The clinical picture of flexion contracture consists principally in the abduction, outward rotation and flexion of the hip joint while the knees also are held in flexion at an obtuse or sometimes even acute angle so that the heels almost touch the buttocks. With the contracture of the biceps, external rotation of the leg may occur. The musculature of the lower extremity in this flexion type shows great atrophy of the quadriceps and in other muscles of the leg. Anomalies or even absence of the patella are observed.

c. In the mixed type extension contracture of the elbow with flexion of the wrist is associated with flexion contractures of hips, knees and ankles.

TREATMENT

If we follow the earlier literature we can gain little information as to a definite plan or policy of treatment. Surgical intervention such as supracondylar osteotomy or other operations on the bone has been practiced for many years Forced redressement was carried out by Redard, and shortening of the extensor muscles in flexion contracture was advocated by Hoffa These methods were carried out in patients of all ages and in all degrees and the results as reported in the literature were so variable and uncertain that little is to be gained from them

It seems important to establish certain therapeutic principles for a type of deformity which is so extremely difficult to handle, but the cases differ so much in degree and extent that rigid generalization seems inadvisable

1 The treatment extends both into conservative and operative fields according to the type and degree of the case, but it can be safely asserted that by far the best results are obtained by conservative methods

2 The possibilities for correction are infinitely greater in the newborn or infant than they are even in the very small child They become very much restricted when adolescent age is reached For these reasons the conservative method not only is the method of choice but it must be instituted at the earliest possible age In our series of 60 cases including all degrees, we missed more than once the propitious moment when conservative treatment should have produced the best results

3 Not all contractures offer the same resistance to correction, but there are differences not only according to age but also according to the type of contracture On the whole, flexion contractures of the wrist, even if moderate, are very resistant On the other hand, extension contracture of the knee in the very young as a rule yields easier than flexion contracture Extension contracture of the elbow is particularly rigid although it too will yield to continuous and gradual corrective methods On the other hand the clubfoot deformity yields better to conservative corrective means than does the usual congenital clubfoot Congenital dislocation of the hip seen in this condition is more often bilateral and it is of the prenatal type As such it is much harder to handle than the ordinary congenital dislocation

Conservative Treatment For extension contractures of the knee corrective casts should be applied weekly with slight corrective manipulations between applications This is followed by a double hip spica which may include the feet so that at the same time corrective effort may be made to overcome the clubfoot deformity The flexion contracture of the knee which is more resistant shows two principal obstacles danger of subluxation of the knee, and the tension produced upon the sciatic nerve and the vessels This type of deformity is most common and is always associated with flexion contracture of the hip Flexion outward rotation and abduction contracture of the hip is particularly difficult to overcome by conservative methods It requires the earliest possible treatment since by nature the contracture is very obstinate and is enhanced by the early habit of the patient to sit on his haunches with the knees flexed under him

In the upper extremity the principal problem is the extension contracture of the elbow for which, obviously, the contracture of the triceps alone cannot be responsible We are here confronted with considerable capsular shrinkage which is even much more difficult to overcome than the contracture of the muscle itself Traction must be slow and must be repeated often and only small gains are obtained from one application to the next Adduction contracture of the shoulder offers the least resistance to passive correction and as a rule manipulation assisted by braces will suffice In the wrist joint, on the other hand, we may find that flexion contracture is very resistant

Operative Methods Theoretically it should be possible to restore the joint position to normal as long as there is no ankylosis and as long as all soft tissues are removed There are, however, definite practical limits which in particular are determined by the nerves and vessels which will not tolerate any degree of stretching without grave damage to nerve function and circulation In many cases it will be necessary to resort to a pseudocorrection by osteotomies performed in the neighborhood of the joint

1 In extension contracture of the knee with

genu recurvatum, when conservative methods have failed, it may be necessary to perform a plasty of the extensor apparatus after releasing all contracted structures and forcing flexion of the knee. It is particularly the expansion of the quadriceps reinforcing the capsular apparatus which constitutes the main obstacle. The mere lengthening of the quadriceps tendon is entirely insufficient, and it is necessary to add extensive capsular plasty in order to fill the gap in the anterior capsular apparatus.

2. Still more difficulties are encountered in flexion contracture of the knee joint. Conservative methods can be carried out only to the point when a posterior subluxation becomes imminent. Then it is time to operate, removing one obstacle after another, that is, tenotomy of the hamstrings, posterior capsulotomy and, last, supracondylar osteotomy. Even this can be carried out only to the point where the nerves and vessels become intolerant of further correction, although to a certain extent nerves and vessels may accommodate themselves gradually to a limited amount of stretching.

3. In flexion contracture of the hip operative methods may be necessary after exhausting all conservative methods to remove all obstacles. This is done in the Campbell and Soutter procedures. In practice we find that subtrochanteric osteotomy, although it produces only a pseudocorrection, is a very efficient and safe procedure, but it should be carried out only on one side at a time so that the pelvis can be properly fixed by hip spica.

4. In the upper extremity operation may be necessary for extension and pronation contracture of the elbow, consisting of the lengthening of the triceps and the stripping of the posterior capsular apparatus.

5. In the shoulder joint it is only the inward rotation which occasionally requires operative procedure in the form of a transverse osteotomy at the level of the deltoid insertion, an operation similar to that devised for birth palsy.

6. Severe cases of flexion contracture of the wrist which cannot be managed by conservative means require operative procedures. The mere lengthening of the contracted tendons of fingers and wrist is inadequate. It is better to wait until the age of 8 or 10 years and then to carry out the resection of the wrist; in this procedure one should not omit shortening the extensor tendons which would otherwise be too redundant to have any mechanical effect.

7. The restoration of active motion naturally depends upon the state of the muscles at the time treatment is undertaken. In the muscle which gave no electric response whatsoever the outlook for functional restoration was poor. That did not interfere with the advantage of correction of the contracture of the lower extremities. Weight-bearing ability developed even with a minimum of muscle power, or with practically no muscle power at knees and ankles so long as the deformities were corrected.

In the upper extremities a number of cases did not develop active motion in the elbow because of absence of muscle material. The majority, however, achieved enough control to bring the hand to the mouth. In some cases the flexor plasty of the elbow restored the power of elbow flexion.

Completion and Maintenance of Correction. Usually one does not obtain full correction at the time of operation. More often it is necessary to complete it during the after-treatment by means of traction devices or splints. In the knee joint the turnbuckle cast and elastic traction have been found to be particularly useful in the after-treatment. In the wrist joint we practice rather a conservative degree of resection for the reason that further correction of the joint can be accomplished later by a proper elastic splinting.

In other words, following operation it is wise to allow a certain latitude to the adaptability of the soft tissues. On the other hand, the tendency to recurrence of the deformity after operation must not be overlooked. This is particularly true of the hip joint and in cases in which only soft tissue operations have been performed. In the wrist joint also the more powerful flexor muscle will constantly operate against the maintenance of the position of correction, necessitating the use of protective braces for a considerable length of time. Another good reason for applying braces during the after-treatment is the weakness and instability of the weight-bearing joints and particularly the knee which needs protection more than any other articulation of the body.

An important problem is the development of the muscular apparatus by and during the after-treatment. There are so many degrees of degenerative changes that the outlook for subsequent development varies greatly. No doubt static functions of standing and walking contribute to the development of whatever muscle power is left and hence it is advisable to resume standing and walking as early as possible, that is, as soon as the alignment obtained is sufficient for the resumption of static function

On the whole we may say that the timely treatment of this deformity is worth-while. Only a few very severe cases derived no material benefit from it. The great majority became ambulatory without braces or crutches and most of them gained a satisfactory use of the upper extremities as well.

Repair of Femoral Hernia: New Procedure*

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CHICAGO, ILL.

MANY procedures have been employed for the surgical repair of a femoral hernia. These procedures in general may be divided into three categories:

1. Without repair of the femoral ring.[1, 7]

2. Closure of the femoral ring inferior to Poupart's ligament (crural route).[2, 8]

3. Closure of the femoral ring superior to Poupart's ligament, (inguinal route).[5, 2, 3, 6, 9, 10]

The recurrence rate varies from 1 to 30 per cent according to numerous authors reporting. Apparently the inguinal route seems superior[5, 2, 6] although there is not yet complete agreement.[11] There are cases in which the crural route is indicated because a more conservative operation is preferred.[1, 7]

It is not the intention to discuss the different procedures here. Such complete discussions have been published by Dujarier,[2] Watson,[4] MacClure and Fallis[5] and others. The purpose of this paper is to present briefly a new procedure by the crural route which was employed in 11 cases during 1944-1945.**

I am not in a position to give the results regarding recurrences since the average postoperative followup was six months and I agree with Watson[4] that the followup should be at least two years. Because of our departure from Greece, unfortunately, we did not have the opportunity to follow all those cases for an adequate time.

TECHNIC OF OPERATION

A vertical incision is made over the femoral mass. The cribriform fascia is dissected, the hernial sac is exposed, isolated and opened. Then proceed according to the content. The sac is ligated high, the fat that may be present at the pectineal fascia is removed. Chromic catgut No. 0 carried in a large round needle is passed through Poupart's ligament near the pubic process and then through a portion of the pectineus muscle, one-third to one-half of its thickness, according to its development. The chromic catgut is guided horizontally and leaves the pectineus muscle and fascia at a point beneath the femoral vein, which has been retracted laterally. The same chromic catgut pierces Poupart's ligament at a point opposite it from below (Fig. 1). The assistant now pulls the edges of the chromic catgut B and pushes down Poupart's ligament on pectineal fascia and muscle in order to approximate both structures. At this time the operator passes two (occasionally one or three) fine chromic catgut sutures CC through Poupart's ligament, pectineal fascia and pectineus muscle, so as to include and cross suture B, and ties. Consequently the edges of the chromic catgut BB (Fig. 2) are tied under tension as a continuous suture is done (Fig. 3). In some later cases I used cotton thread.

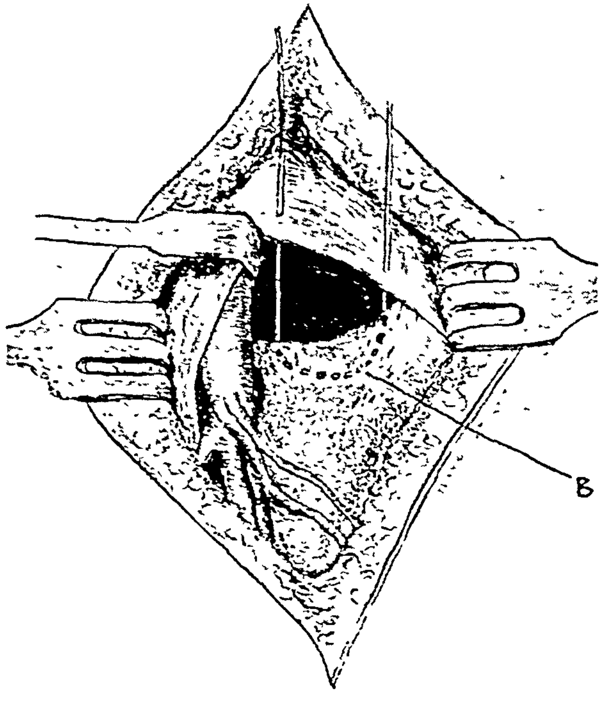

Fig. 1.

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* From the surgical section of Dr. N. Vryonis, Municipal Hospital, Athens, Greece.

** At the Surgical section of the Municipal Hospital of Athens, Greece.

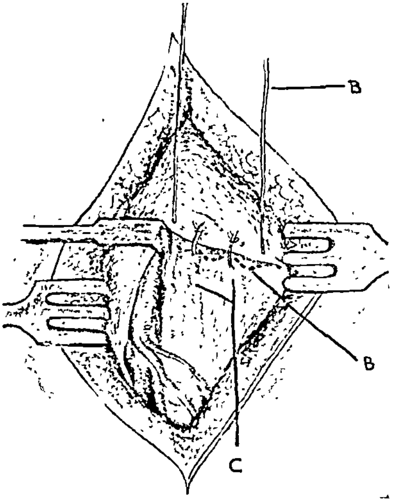

Fig. 2.

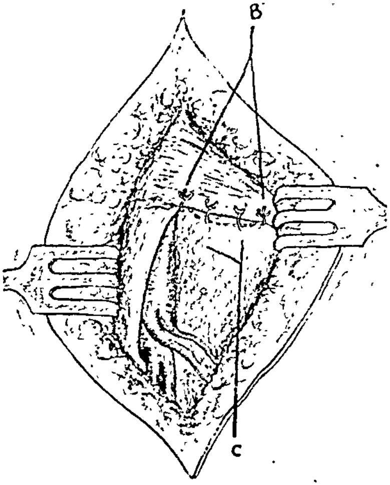

Fig. 3.

My 11 cases were distributed as follows:

Males	3,	right 3,	left 0
Females	8,	right 5,	left 3
Total	11,	right 8,	left 3

Among the females, three were nulliparas. The other five had had an average of four normal to term pregnancies; several had had miscarriages.

CASE REPORTS

Case 1. S. P. A single white male aged 23. He was admitted Nov. 20, 1944, complaining of pain and a reducible mass in the right crural region since 1939. Otherwise the past history was noncontributory.

Physical examination revealed a well-developed white man with reducible right femoral hernia. Laboratory tests were negative. Operation by the procedure described above was performed Nov. 23, 1944, for right femoral hernia under local anesthesia with 1 per cent procaine. Postoperative course was uneventful and the patient was discharged on Dec. 2, 1944.

Case 2. A. K. A married white female aged 35. She was admitted Nov. 22, 1944, with a story of a reducible mass at the left crural region since 1939. There was a past history of malaria. The patient had had one normal delivery and one miscarriage. Menstruation was regular.

Physical examination revealed a well-developed white female with reducible left femoral hernia. Laboratory work was negative. The patient was operated on Nov. 23, 1944, under local anesthesia by the procedure described above, and was discharged on Dec. 2, 1944.

Case 3. Z. P. A married white female aged 55. She was admitted on Feb. 24, 1945, complaining of a tender reducible mass at the right crural region for six months. There was a past history of pneumonia and malaria. In 1938 she was operated upon for left femoral hernia. She had had eight normal deliveries. Menstruation was regular until 1943.

Physical examination revealed an underweight white female with a reducible right femoral hernia. Laboratory work disclosed mild azotemia for which she received medical treatment. The patient was operated on Mar. 1, 1945, under local anesthesia by the procedure described above. Slight subcutaneous suppuration developed.

Case 4. D. N. A married white male aged 49, was admitted on Mar. 8, 1945, with complaints of

of malaria. There had been 6 normal deliveries. Menstruation was regular. The menopause occurred in 1937.

Physical examination revealed an emaciated white female with a reducible right femoral hernia and rectocele. The hernia was repaired Sept. 18, 1945, under local 1 per cent procaine anesthesia by the above described procedure and the rectocele on Aug. 30, 1945. The postoperative course was uneventful. She was discharged Oct. 16, 1945.

COMMENT

It is suggested that this procedure is simple and satisfactory. Its originality lies in the fact that I do not use ordinary sutures between Poupart's ligament and pectineal fascia, but I support the sutures by the suture B, which gives a blunt support to the muscle and fascia, thereby avoiding tearing and necrosis of these tissues. In case of a thin pectineal fascia, and when other procedures are not advisable, this method tends to lend a strong support to the fascia and muscle so that they are not easily torn.

Effort should be made to arrange equal portions of muscle mass at the three spaces by the sutures C (Fig. 3), and to avoid pressure on the femoral vein.

SUMMARY

A new procedure for repair of femoral hernia has been described, with 11 cases reported in which this procedure was employed. The followup period in these cases is too short to permit an estimation of the effectiveness of the procedure. In those seen postoperatively no recurrence was noted.

RIASSUNTO

Descrive un nuovo metodo operatorio per la cura dell'ernia femorale. In 11 casi così operati, nessuna recidiva e' occorsa dopo un certo tempo. L'intervallo e' pero' troppo breve per consentire un giudizio definitivo al riguardo.

SUMARIO

Se ha descrito un nuevo procedimiento de reparacion de la hernia femoral usado en 11 casos del autor. El periodo post-operatorio es aun muy corto para estimar definitivamente el valor de este procedimiento. En estos casos aun no ha habido recurrencia.

SOMMAIRE

Un nouveau procédé pour la guérison de la hernie fémorale a été decrit, les onze cas dans lesquels cette technique fut employée. La période post-opératoire est trop brève pour permettre une appréciation définitive sur la valeur du procédé. Jusqu'à présent il n'y eut récidive dans aucun cas.

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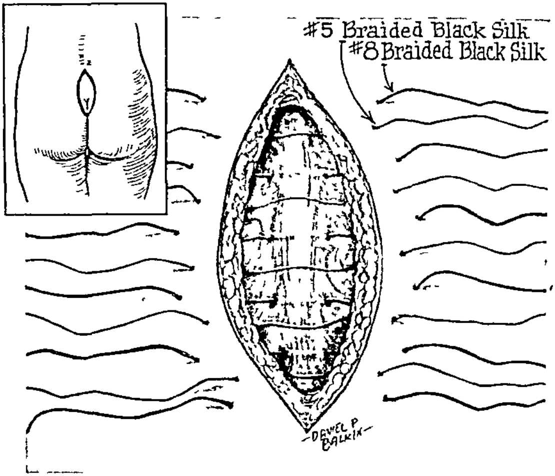

Fig 1. Complete excision of cyst down to sacrococcygeal fascia.

therefore, consists of hot sitz baths and hot wet dressings. During this period the patient is given relief from pain which usually is the primary complaint. After localization the "abscess" is incised and drained, using local or pentothal anesthesia The wound is packed with iodoform or vioform gauze packing and after 24 hours sitz baths are again instituted two to three times daily and pack removed. To assure proper healing, granulation from bottom up, and complete obliteration of the cavity, the patient is seen three times weekly and the wound repacked and dressed. When only one cyst is present it is not uncommon after the above treatment to obtain a permanent cure, the infection having destroyed the epithelial lining cells. If other cysts and sinuses are present or the cyst or sinus persists, the patient passes into our second classification and is treated accordingly.

Chronically Infected Cysts and Sinuses. In our second classification are those cases where there has been previous drainage of one or more infected cysts, and/or previous surgical excision of sinuses subacutely inflamed or infected. In these cases it is felt that treatment by the open method is the treatment of choice, though where no acute reaction is present, primary closure may be attempted. Prior to hospitalization these cases are instructed to take two to three sitz baths daily with thorough cleansing of the lesion. At surgery the tracts are explored after spinal anesthesia by the use of flexible probes. The use of dyes has been discarded because of the possibility of spreading the infection. When probes are used they are left in situ during the excision to assure complete and adequate removal of involved tissue down to the sacral coccygeal fascia. Where the defect after incision is unusually large, we have on occasion sutured the skin edges to the sacral coccygeal fascia in the midline in so far as practicable, using No. 5 black silk. We believe this has shortened the period of disability. In any case, the wounds are packed for hemostasis and in 48 to 72 hours the patient is started once again on sitz baths. The average period of hospitalization in these cases is five to seven days. Subsequent office treatments three times weekly assure proper healing and obliteration of the space. Weeks may be required to accom-

Surgical Principles in the Treatment of Pilonidal Cysts and Sinuses*

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CHICAGO, ILL.

PILONIDAL cysts are hair-containing cysts in the sacrococcygeal region. They are situated in the midline in the posterior raphe over the coccyx. The sinus tract is lined by squamous epithelium in which hair is frequently found; however, when suppuration occurs, the lining cells are frequently destroyed. The origin of pilonidal cysts is still undecided.

Conrad (1883), Stone (1924), and Weinstein (1933), in reviewing the literature, found that J. M. Warren was the first to report this lesion. Warren felt that the lesion was the result of an alteration of the polarity of growth of the hair follicle which grew inward from the surface and pulled "its hole in after it." Hodges, in 1880, named the lesion pilonidal sinus (meaning nest of hair) and believed that it was caused by the ingrowth of hair in the postanal region as the result of unclean habits and erosion of the skin. Another author believed that the hair acted as a plug, causing retention of infected material in a fistulous tract. Others believed that the anomaly followed inclusion by the skin of surface hair follicles.

At present there are two prevalent theories as to the etiology of pilonidal sinus. The first theory is that which traces the origin of the condition to a persistence of coccygeal vestiges of the neural canal, and the second embodies the idea that the lesion is derived by a process of ectodermal invagination.

Fox,[1] after a careful study on human embryos, concluded that "a pilonidal sinus is a derivative of skin ectoderm and not neurogenic or enteric in origin," and that "the structures forming the sinus are derived by a process of ectodermal invagination from the skin surface during the third and fourth months of embryonic life in the cells destined to form skin appendages (hair and glands)." Fox also concluded that recurrence following operation for pilonidal sinuses should occur in less than 10 per cent of the cases and is due to the fact that certain of the ramifications are left behind.

Pilonidal cysts rarely become clinically evident until infection occurs, usually from the eighteenth to twenty-fifth year of life. Cases seen in infants are very rare.

In order properly to understand the treatment of pilonidal cysts or sinuses one must first understand the pathology. Normally, in the uncomplicated lesion, a sinus tract or tracts lined by squamous epithelium is the primary pathology. Infection of such tracts destroys the lining cells and leads to cyst formation, abscesses, and/or chronically draining sinuses. Complete excision, therefore, of the epithelium-lined tract or tracts is necessary if healing is to take place.

Of first consideration in the treatment of pilonidal sinuses or cysts is a proper evaluation of the status of the lesion. Having evaluated the disease, its correction by adherence to fundamental surgical principles is undertaken. With respect to the surgical treatment of this condition we choose to classify pilonidal cysts or sinuses as follows: (A) Cysts, acutely infected (suppurative); (B) chronically infected cysts with multiple sinuses (usually with history of previous surgery or drainages); (C) clean sinus tracts without history of infection. Having thus classified each case, cure can be assured by the application of accepted surgical principles. There are no short cuts, magic medicines or fancy operations which can be substituted for fundamental surgical principles for the complete relief from this condition.

Acutely Infected Cysts. In the treatment of acute suppurative lesions one must obtain localization until fluctuation occurs as in any acute infectious process. Early treatment

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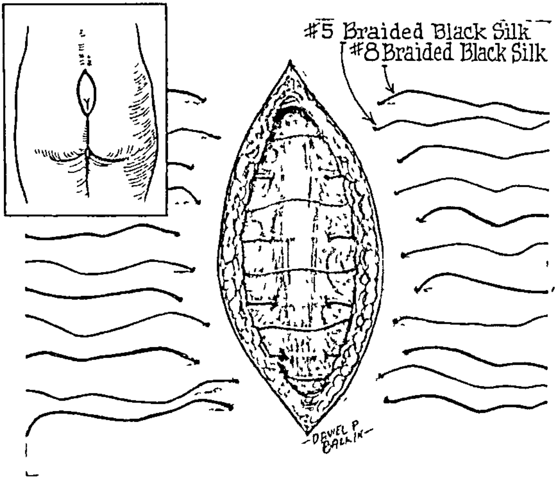

Fig 1 Complete excision of cyst down to sacrococcygeal fascia.

therefore, consists of hot sitz baths and hot wet dressings. During this period the patient is given relief from pain which usually is the primary complaint. After localization the "abscess" is incised and drained, using local or pentothal anesthesia The wound is packed with iodoform or vioform gauze packing and after 24 hours sitz baths are again instituted two to three times daily and pack removed To assure proper healing, granulation from bottom up, and complete obliteration of the cavity, the patient is seen three times weekly and the wound repacked and dressed. When only one cyst is present it is not uncommon after the above treatment to obtain a permanent cure, the infection having destroyed the epithelial lining cells. If other cysts and sinuses are present or the cyst or sinus persists, the patient passes into our second classification and is treated accordingly.

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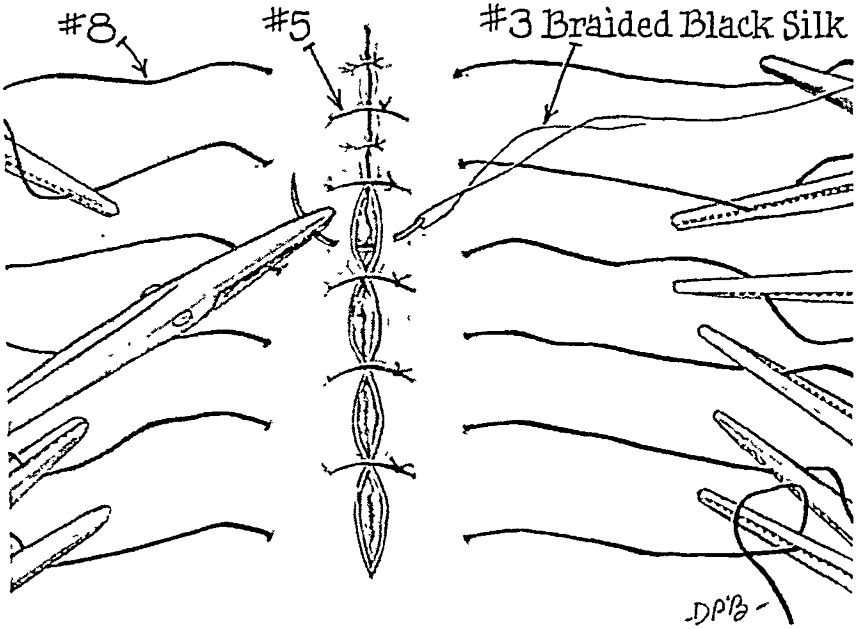

Fig. 2. Sutures in situ.

plish complete healing but this does not incapacitate the patient in any way unless he happens to be a six-day bicycle rider or gymnast. Excess granulations during the healing process are removed with silver nitrate applications and the surrounding skin repeatedly shaved to prevent the ingrowth of hair.

Clean Cysts and Sinuses. These cases are treated by excision and closure per primum.

In the preparation of these patients for surgery, penicillin is administered by injection for 48 hours preoperatively. The involved area and both buttocks and back are carefully shaved. The upper thighs and perineum are included. Cleansing enemas are given the night before surgery as this method of repair almost precludes the movement of the bowels for four to five days postoperatively. In surgery the operative field is scrubbed with green soap and water for 10 minutes and the area prepared with iodine and alcohol. Spinal anesthesia is the anesthetic of choice. The patient is placed in a jackknife position on the operating table after the anesthesia is fixed and the buttocks separated by adhesive tape strapping to the sides of the table. These are released before closure.

The following *surgical principles* must be followed in the operative procedure:

1. Complete excision, using the method previously described after marking by probes. Skin is not sacrificed unnecessarily although walls are best kept nearly perpendicular. This excision is done in such a manner as to minimize the trauma to tissue to be retained.

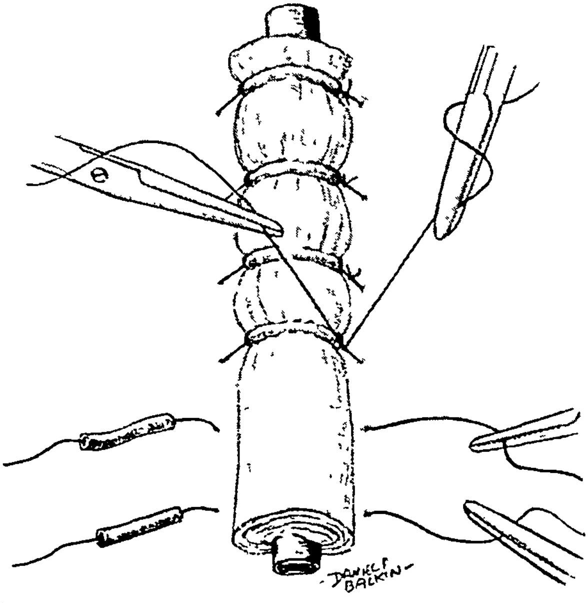

Fig. 3. Pressure applied with soft rubber tube wound in gauze and tied with No. 8 sutures.

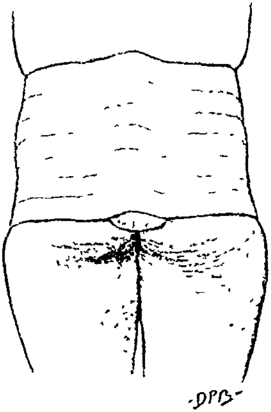

Fig 4. Firm pressure dressing to site of incision and buttocks

2. Absolute hemostasis is next obtained. This is of prime importance in the prevention of infection, recurrence, and hematomas. Bleeders are tied, using 000 plain catgut ligatures, compromising the minimum amount of tissue. The minimum amount of catgut necessary to obtain hemostasis is buried. It is believed that the accumulation of blood, serum, unabsorbed catgut and necrotic tissue are factors in the complications which are seen following primary closure of these wounds.

3. Obliteration of space and closure of the wound is the third step in this operative procedure. In our method of treatment the wound is closed for primary healing, using braided black silk sizes 3, 5 and 8. None of these sutures are buried. They are placed as illustrated in Figures 1 and 2. All sutures are tied with the greatest of care and the skin carefully approximated. The deepest sutures (No. 8 black silk) are placed first and include the sacral and coccygeal fascia. These sutures are the last to be tied and are tied over a gauze-covered rubber tube as shown in Figure 3. The No 3 black silk sutures are used only to approximate the skin edges.

The postoperative care of cases closed per primum is most important This care begins with the proper application of the first dressing in the operating room. This dressing is applied as illustrated in Figure 4 This dressing is left undisturbed for four to five days unless severe pain and hyperpyrexia are present which indicate postoperative infection Penicillin is continued postoperatively in average doses. The patient is instructed to lie on his abdomen, keeping his legs together Bowel movements are not anticipated until the fourth or fifth day although no constipating drugs are given. The patient is kept on a low residue diet. On the fifth day the original dressing is changed and the deep sutures removed. The remaining sutures are fractionally removed on the eighth and tenth day. Occlusive dressings bringing buttocks snugly together are applied each time. Mineral oil is usually started on the third or fourth day and when the patient is ready to move his bowels, he is instructed to squat over a commode at the bedside. After the fifth day the patient is permitted to be out of bed but not to sit. He is instructed in walking, taking short steps, and to lie in bed on his

TABLE 1

Type of Case	No	Treatment		
		Incision and Drainage	Open	Primary Closure
Type (A) Acutely Infected Cysts	13	13		
Type (B) Chronically Infected Cysts and Sinuses and Those Previously Operated On	17	0	5	12
Type (C) Clean Cysts and Sinuses	20	0	0	20

sides only, still keeping his legs together.

Should at any time the wound show signs of infection during the postoperative course it is immediately opened as widely as necessary and packed, after which it is treated as in the open method. No time is thus lost and a cure assured. Under these circumstances and in wounds treated by the open method the wounds are carefully watched as they granulate from the "bottom up." The area is shaved as often as necessary to prevent the ingrowth of hair.

After the use of many of the various technics and procedures in the treatment of pilonidal cysts and sinuses in a large private surgical service, the methods illustrated have been found to be the most successful.

In reviewing our last 50 cases treated in accordance with the outlined principles, as shown in Tables 1 and 2, 95 per cent of the clean cases treated by excision and primary closure resulted in permanent cures. Of the chronically infected sinuses and cysts 66.66 per cent of those closed per primum healed, and 33.33 per cent had to be opened and packed. Although these cases had to be opened in part, it is felt that nothing was lost and actually the attempted closure was a time-saving measure. Cases severely infected should not be closed.

In a follow-up of these cases (all types) there was a recurrence rate of 6 per cent.

TABLE 2

Cases Excised and Primarily Closed

Type of Case	No.	Healed Per Primum	Later Opened	% Healed Per Primum
Type (B)	12	8	4	66.66
Type (C)	20	19	1	95

CONCLUSIONS

1. Proper evaluation and choice of procedure with adherence to accepted surgical methods and technics are of the utmost importance.

2. The three fundamental surgical principles followed are: complete excision, absolute hemostasis, and obliteration of the space.

3. Pre- and postoperative care are important, there being no short cuts or magic treatments.

4. With the illustrated methods, the period of disability is minimal, averaging 7 to 10 days hospitalization with only partial disability (horseback, athletics, etc.) for a period of 30 to 60 days thereafter. Time lost from work rarely exceeds 10 days.

RIASSUNTO

I risultati della cura chirurgica dipendono essenzialmente da una precisa valutazione clinica dei singoli casi e da una stretta aderenza ai metodi operativi generalmente accettati. I principi fondamentali consistono: nell' escisione completa, nell'emostasi perfetta, nell'obliterazione dello spazio. Notevole importanza assumono inoltre le cure pre- e postoperatorie.

Con i metodi descritti dall'A., il periodo di inabilita' si riduce ad un minimo: 7-10 giorni di ospedalizzazione, con una disabilita' parziale che dura da 30 a 60 giorni. L'assenza dal lavoro supera di rado i 10 giorni. Nessuna recidiva.

SUMARIO

Es de gran importancia la propria seleccion del procedimiento de mas valor en cada caso; con minuciosa adherencia a procedimientos y tecnica quirurgica cuyo valor es reconocido. Los tres procedimientos quirurgicos fundamentales que se debed de seguir en todos los casos, son: excision, hemostasis absoluta, y obliteracion de todo espacio. El tratamiento pre y post-operatorio son de importancia. Con los metodos que se han ilustrado, el periodo de desabilidad es minimo, con un average de 7 a 10 dias de hospitalizacion y un total de 30 a 60 dias de desabilidad parcial (atletismo, etc.). El tiempo que se pierde de la ocupacion del paciente raramente excede de los 10 dias.

SOMMAIRE

Pour l'évaluation d'un choix de procédure réfléchie, l'adhérence aux méthodes techniques chirurgicales acceptées, est de la plus grande importance. Les trois principes chirurgicaux

fondamentaux suivis sont: l'excision complète, l'hémostase absolue et l'oblitération des espaces vides. Les soins pré et postopératoires sont d'une grande importance. Avec les méthodes illustrées, la période d'infirmité est minime, une moyenne de 7 a 10 jours à l'hôpital et l'incapacité partielle pour une période de 30 a 60 jours. La durée de l'éloignement du travail excède rarement 10 jours.

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Tuberculosis of Bones and Joints

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TUBERCULOSIS of bone or joint, like syphilitic lesions, may be spoken of as a "tertiary lesion." Primarily, there is the Ghon Focus, usually present in the parenchyma of the lung and as a rule well out toward the chest wall. When present in the lung, this focus represents an inhalation infection. On occasion the focus may be demonstrated in the abdominal cavity, here being the result of ingested infection. This Ghon Focus almost invariably heals, leaving only a minute calcified nodule indicative of its former activity. Second, there occurs a frank pulmonary, tracheobronchial adenitis, or abdominal lymphadenitis, either as a result of reinfection of exogenous origin or endogenous from the primary infection which has not followed the almost invariable rule governing the Ghon Focus. Such secondary lesions again may heal with little resultant evidence of their former activity. A latent focus of infection may, however, remain in the lymph nodes of the venous angle. Third, the tertiary lesion: Active tubercle bacilli are taken up by the blood stream, from the secondary lesion, and carried through the vascular system, lodging in some predisposed site—predisposed either through trauma, often of so minor a degree that its occurrence passed unnoted, or predisposed through inflammatory reaction from any cause.

These tertiary lesions are an endarteritis. The bacilli, having been taken up by the blood stream, show a predisposition to locate in areas of increased blood supply and where ramifications of the vessels are present. This explains the predominance of joint lesions. The bacilli may produce a tuberculous embolus, or circulating toxins cause an obliterating endarteritis. Where the lesion is embolic in nature, the earliest evidence may be found in cancellous bone, that is, in the end of bones in the neighborhood of the joints, or the earliest evidence may appear in the circulus vascularis, that is, in the reflection of the synovial membrane onto bone.

Where a toxic endarteritis occurs, it is localized in the small arteries in the bone marrow and therefore may be irregular in distribution. This toxic endarteritis may be the course of events in tuberculous dactylitis. Where the circulus vascularis is the site of infection, a tuberculous synovitis results and the lesion spreads from the synovia to the adjacent bone. Since the earliest symptoms of tuberculosis of bone are predominantly referred to the joint, it would appear that the synovia was primarily involved. This would point to the circulus vascularis as the place of most frequent lodgment of the tuberculous embolism or endarteritis. This, in turn, would support the view that tuberculosis of joints is, first of all, a tuberculous synovitis, spreading thence to the adjacent bone. Furthermore, the type of lesion seen in the upper and lower ends of the femur is indicative. In the upper end of the femur the synovium is reflected well down on the metaphysis, and metaphyseal tuberculosis is frequently seen in that area. In the lower femur, the synovium does not reflect beyond the epiphysis, and epiphyseal, not metaphyseal tuberculosis results. It is therefore probable that if the diagnosis could be made early enough it would be seen that all tuberculosis of joints starts as synovial involvement.

It is commonly considered that 75 per cent of tuberculosis in children is the result of a bovine type of tuberculous infection. In proof of this, the high incidence of infection in the tonsils, tracheobronchial and abdominal lymph nodes is cited, the presumption being that the infective agent is ingested, probably in cow's milk. Infection in tonsils and tracheobronchial lymph nodes may equally well be the result of inhalation infection. In a study made some years ago in the Detroit area, it was impossible to demonstrate a single true strain of bovine tubercle bacillus in the 25 strains isolated (22 children and 3 adults).[28]

In the obliterating endarteritis in marrow, the result is a tuberculous osteomyelitis. In the early stage bone destruction exceeds bone production and the periosteum becomes secondarily involved The lamellar plate may be completely destroyed with pointing of an abscess to the surface If destruction of the marrow proceeds without destruction of the lamella, sequestra result

As the tissues build up a defense against the infection, an attempt is made to wall off the disease first by granulation tissue and then by fibrosis The production of new bone gradually exceeds the destruction and an attempt is made to regain the strength in the bone with a minimum of added weight Osteoclasts bore into the smooth shaft to produce roughening, permitting attachment of new bone cells Areas of granulation become bridged over and enclosed by the new bone arching over the granulations

PROGNOSIS

Prognosis depends entirely upon the ability of the body to produce resistance to the disease either through its own efforts and conservative treatment or, aided by surgical intervention, by an attempt to eradicate the disease or limit its extension Progress during the first few months is usually down grade Thereafter, if and as immunity develops, the course straightens out and gradual improvement takes place

Our efforts to stimulate this building up of resistance in the presence of active disease have so far been far from successful In a recent study Alan De Forest Smith[2] refers to the work of Lavelle who said that the blurred areas at times seen in the roentgenogram in the vicinity of tuberculous bone foci represent areas containing powerful defense substances which are blocked off from the circulation by a tight capsule which constricts the veins and lymphatics and so prevents the escape of these antibodies He suggests boring into these areas to permit the escape of this defensive substance into the circulation and thus increase the body resistance to the disease Smith points out the difficulty in recognizing which area should be opened There is always the danger of opening into an area of active infection and producing a spread of the disease rather than stimulating the defense against it

DIAGNOSIS

Diagnosis is not always easy In a weight bearing joint there may be no complaint beyond a tendency to limp without apparent cause Later, some stiffness develops with its accompanying limitation in movement Muscle spasm can then be demonstrated pain on using the limb commences the joint may feel warmer than normal to the touch and some increase in the size of the joint may be noted At such time as the joint surfaces become eroded, there will be a voluntary attempt to limit the motion in the joint with resultant wasting of muscles The so called "night cries" may appear, the involuntary moving of an eroded joint surface during sleep producing pain The child may show an afternoon elevation in temperature

In the early stage x rays may show no definite abnormality There may be a suspicion of narrowing in the joint space, but if any effusion has occurred this narrowing may be obscured In x raying, compare the adjacent bone in both limbs, especially in weight bearing limbs and, if possible, include the whole length of the bone An increased rate of growth may be noted in the adjacent bone of the affected limb For instance, the patella in the affected limb may be slightly larger than in the normal leg Where a dactylitis is suspected, especially in the foot the first x rays may be entirely negative, but the child continues to complain Subsequent x rays may suddenly show a gross lesion within a six to eight weeks' period In the diagnosis of a dactylitis, the similarity to the appearance of a syphilitic infection must be kept in mind, the spindle shape of the swelling involving the whole shaft

If fluid can be demonstrated within the joint, aspiration may produce a clear, straw colored fluid from which bacilli may be isolated as shown by guinea pig test Aspiration must be carefully done in order to avoid as far as possible, the formation of a sinus tract

In tuberculous spondylitis the early narrowing of the intervertebral joint space must be differentiated from a prolapsed intervertebral disk Scheurman's disease and Calve's vertebra plana must also be kept in mind, the latter especially in childhood Calve describes the x-ray picture as showing a thin, wedged, flat vertebra, affecting one vertebra only. Subsequent films will show a marked tendency to regeneration in vertebra plana, as contrasted to the progressive degeneration in tuberculosis. In hip joint lesions, a lateral x-ray view will give added information.

The earliest x-ray changes seen will be a rarefaction due to the hyperemia. Absorption of the cartilage with narrowing of the joint space may be noted later though, as stated above, this narrowing may be missed owing to the distention of the joint with fluid. Where cartilaginous destruction can be visualized, the destruction will appear first near the periphery of the joint, the panus spreading in from the edges. As destruction proceeds, cavitation may be seen in the bone close to the articular margins.

In roentgenologic differential diagnosis the differences between tuberculosis, syphilis, and pyogenic infections should be recognized. In tuberculosis the margin of the bone shows definite sclerosis with the underlying bone indicating intense atrophy. In syphilis also, the margins are sclerosed, but the underlying bone is dense. In pyogenic infection no sclerosis is evident and the underlying bone appears of normal density.

There is some controversy on the point of the narrowed joint space. Phemister,[1] in a recent article on the differentiation between pyogenic and tuberculous arthritis, says that in pyogenic arthritis destruction of the cartilage occurs early at the points of contact and pressure and that the action of proteolytic ferments removes the necrosed material, so that the joint space is narrowed early, whereas in tuberculosis the destruction of the cartilage proceeds inward from the periphery following the inward growth of granulation tissue. Proteolytic ferments are absent and therefore any cartilage which is destroyed remains in the joint for months or years until absorbed by granulations. In Smith's experience, the joint space is narrowed early in tuberculosis.[2]

In diagnosis, some points referable to the various joints may be noted. In the shoulder, caries sicca should be kept in mind. Caries sicca is a rare condition, affecting chiefly the upper end of the humerus in early adult life. According to Boyd[6] the deep bone is replaced by granulation tissue, with erosion of the bone surfaces and roughening. This granulation tissue gradually dries and is superseded by fibrosis, no true suppuration occurring. Willemin and Protar[7] mention the similarity between caries sicca and Legg-Calve-Perthe's disease. They consider caries sicca an epiphysitis of the proximal end of the humerus showing, in the x-ray film, a picture similar to Legg-Calve-Perthe's disease as seen in the hip, but since the shoulder is not a weight-bearing joint the course of events is altered accordingly. In other forms of tuberculosis in the shoulder this nonweight-bearing factor accounts for the lessened destruction in the joint, although the articular surfaces are invariably involved by the time diagnosis is made. The muscle spasm early fixes the scapulohumeral movement and this also tends to lessen the amount of destruction.

In the elbow, also, tuberculosis is rarely seen. When seen early, movement is only restricted, not abolished, with this restriction becoming more marked and the joint developing increased heat and swelling.

In wrist and carpals, complete recovery in the child is possible with conservative treatment since in the child lesions in this area remain localized. In the adult the lesions are more widespread, usually involving the radiocarpal articulation and necessitating arthrodesis.

In the skull, the invasion is first noted in the diploe, the infection spreading outward to involve the outer table.

Tuberculosis of the hip has the same frequency in children as tuberculosis of the spine. The over-all incidence of hip joint lesions in adult and child approximates 30 per cent of all bone and joint involvement. Of this 30 per cent, 85 per cent occur in children. The neck of the femur is the most frequent site of infection, the upper outer edge of the acetabular rim of the ilium next, and third, the ischium at the lower border of the acetabulum. As elsewhere, synovitis is the forerunner of actual bone involvement and, since the joint is deep-set, diagnosis often is difficult. Pseudocoxalgia and a transient arthritis must be kept in mind. The painless limp and the stiffening of the joint may occur in all three, the later muscle spasm and muscle wasting along with the increased heat in the joint and the swelling are more indicative of tuberculosis

In the lower end of the femur one condyle alone may be involved Where this occurs the amount of collapse will be slight but unless the joint is adequately protected malalignment of the joint will occur Gouging out the tuberculous focus and filling the resultant cavity with bone chips faced with a curved graft has been tried So far as I know the end results of this maneuver have not been published In the knee if the diagnosis is *made early enough the adult may show synovial* involvement without apparent bone damage, and a complete synovectomy may permit healthy regeneration It is difficult to detect early synovial involvement in the child since the barriers are less defined and osteomyelitis frequently has developed by the time the etiology is established

Sacro iliac tuberculosis is rare in the child In the adult the onset usually involves the sacrum first, spreading to the ilium The disease tends to burrow forward with such cold abscess as may form, pointing anteriorly and this abscess may rupture into the rectum

Tuberculosis in the ankle region most frequently invades the astragalus second the os calcis, and third the lower end of the tibia Of the metatarsals the first is oftenest involved Below the ankle, tuberculosis tends to spread rapidly and involve adjacent bone Resection excision or even amputation may be advisable

Guri[8], in an extensive article on tuberculous spondylitis classified the various types and forms From this review probably the simplest classification is that by Steindler[9] (1) anterior peripheral, (2) central, (3) epiphyseal forms The anterior peripheral will correspond to the "spondylitis tuberculosa anterior superficialis" and the central form to the "spondylitis tuberculosa anterior profunda" of Loeffler [10] There is some argument as to whether the term "epiphyseal form" should be used True "epiphyseal tuberculosis" should only be seen in children, but tuberculosis adjacent to the disk in the epiphyseal area is seen in the adult Guri goes on to suggest "metaphyseal" as a better term, a lesion occurring contiguous with the intervertebral disk Guri goes on however, to discuss epiphyseal and paradiskal spondylitis In this "paradiskal form the x rays show a progressive thinning of the disk with or without the presence of a circumscribed focus of osteitis or as a destructive process extending along the paradiskal region of one or two contiguous vertebral bodies while the rest of the vertebral body retains its normal shape but with some evidence of decalcification This 'paradiskal classification would meet the requirements in both adults and children The body of the vertebra is supplied by *branches of the posterior spinal arteries* and a limited area of the anterior surface is supplied by branches of the intercostal arteries Therefore the "central' and "anterior peripheral classification falls into line

In children under five years of age spondylitis is the most frequent tuberculous bone lesion Pressure effects of varying extent are seen with approximately 40 per cent of lesions in this area Vertebrae between the tenth dorsal and the second lumbar are involved in 50 per cent and abscess formation can be demonstrated in approximately 20 per cent Where paralysis occurs it is due to edema of the meninges or to pressure from a cold abscess under the posterior common ligament pressing backward upon the cord It is extremely rare that collapse of the vertebra produces sufficient angulation to impinge on the cord or to cause symptoms through stretching the cord over such angulation If paralysis does appear, 90 per cent of such paralyses are said to clear up under conservative treatment [11] If improvement does not occur, laminectomy may be necessary, but such surgical interference is rarely required

While on the question of diagnosis Schumann's remark should be kept in mind[3] "All chronic hydrops of the knee, even where a history of recent trauma is obtained, should be suspected of being tuberculous" Seligson [4] has drawn attention to the numerous degenerative and inflammatory, extrapulmonary lesions which are clinically tuberculous but could not be proved tuberculous either bacteriologically or pathologically They consider that bacillary toxins may be a factor in the production of tuberculous rheumatism Along this same line Klinge[5] draws attention to the variable effects the same organism may have at different times, that is, the same organism may produce septic and purulent inflammatory reactions at times while at others only an allergic response may be evoked at some distance from the original focus. We have all seen mild arthropathies following the use of Old Tuberculin in testing for the presence of tuberculosis and even following a flare-up in the pulmonary lesion.

TREATMENT

The aim of all treatment, initially, is to increase the physical resistance of the patient to his tuberculous infection. As in tuberculosis elsewhere, this means adequate rest, not only of the part involved, but of the whole body. Until such time as the antibody defense is built up the progress of the disease will be downhill. This is the usual course of events during the first four to six months. If the lesions are of an "exudative" type with a tendency to further breaking down and invasion of adjacent tissue, the change-over from downgrade to uphill will be slowed, whereas if the lesions are of the "productive" type, with a tendency to limitation by fibrosis, improvement in the general and local condition may appear well within the period of four months. All the usual adjuncts are essential: rest, good food, fresh air, heliotherapy, immobilization of the affected area, distraction, especially in the spine, to prevent collapse, traction to separate painful joint surfaces, and traction especially in joints showing only synovial involvement to protect the adjacent joint surfaces. In isolated synovial involvement, passive movement of the joint may be carefully carried out to prevent the formation of adhesions. Proper immobilization not only will rest the affected joint, but will prevent the development of deformity or further increase in such deformity as may be present.

This is treatment along conservative lines. Where the synovium alone has been involved such conservative treatment, carried out over a two- or three-year period, may result in good range of motion and good joint function, but watchfulness is essential throughout and for at least three years subsequent to the stage of "quiescence" or "apparent cure."

Quiescence can be judged by the improved general condition, the leveling out of the sedimentation rate (or a constant straight-line fall within a maximum of 20 mm. unchanged over a four-months period), diminution or loss of muscle spasm, and an x-ray appearance showing more normal bone content, sharper, clearer cut bone margins, and the cessation of bone destruction. Once quiescence has been obtained, protected passive movement may be started provided no bone destruction within the joint has been demonstrated at any period. The use of crutches, plus an elevated heel on the good foot may permit ambulation in the case of weight-bearing joints.

Chemotherapy has not shown startling results. According to Hinshaw and Feldman,[12] streptomycin must be used in a minimal dosage of 800,000 units, with an average dosage of 1,000,000 to 2,000,000 S units daily. After nine months these authors felt that streptomycin had had a limited effect on the 34 patients so treated. In a recent note on streptomycin the manufacturers claim definite limiting effects upon pulmonary tuberculosis, but no mention was made of extrapulmonary lesions. Petter[13] says that Diasone (disodium formaldehyde sulfoxylate diaminodiphenylsulfone) does not cure pulmonary tuberculosis, nor does it close large cavities, but does improve 80 per cent of osseous and renal tuberculosis. It is somewhat toxic and must therefore be used with caution, but if so used the reactions are usually mild.

In children, conservative treatment is the treatment of choice since there is no financial loss to be considered from the work-time angle. In tuberculosis of the wrist, elbow, and shoulder, conservative treatment may produce a relatively good joint function in the child. The hip joint tends to lay down fibrosis early and to produce a fibrous ankylosis. This is never safe, and fusion will eventually have to be done, especially since flexion deformity tends to increase unless solid fusion is obtained. By conservative treatment and the use of a modified Bradford frame[29] I have secured apparent quiescence in tuberculous hips with a range of movement of approximately 80 per cent of normal, but the treatment had to be carried out over three years. In none of these cases was it considered safe to discharge the child from treatment until an extraarticular fusion had been done, since our earliest cases had shown reactivation in the joint within six months of unrestricted weight bearing

In dactylitis the infection usually spreads rapidly to involve the whole of the bone Therefore, unless early signs of limitation are present, excision of the metacarpal or phalanx or amputation of the finger should be considered Ahlberg[14] says that tuberculosis of the wrist accounts for 2 2 per cent of tuberculous bone lesions He states that partial resection may give good results but that total resection is most often necessary Following total resection he obtained primary healing in 76 6 per cent of cases postoperative protection being required for an average of five months Ahlberg also emphasizes the importance of immobilizing the wrist in 45 degrees dorsiflexion from the beginning If this position is not maintained not only will the resultant grip in the hand be weak, but the wrist and hand will be awkward to use The simplest method of judging this degree of dorsiflexion is simply to lay your hand and forearm on a table, palm downward then close your fingers to make a fist The resultant dorsiflexion will approximate 45 degrees

In children, conservative treatment may result in retaining a fair amount of movement Abscess formation is rare in the child, and immobilization including the upper arm, may result in healing In the adult, where abscess formation is more common the tendon sheaths may be invaded Early fusion may prevent this spread

In the elbow if conservative treatment has not been satisfactory, resection should be considered While resection may result in a flail elbow necessitating some form of external support such as a leather cuff and side iron joint braces it is surprising how often a relatively stable elbow develops, even to the extent of being able to carry weight through the resected joint If a flail joint is the end result, fusion can always be decided on later In the fusion the humeral condyles the radiohumeral articulation, and the olecranon fossa should be completely denuded of cartilage A bone graft, bridging between the olecranon and humerus assists in the stabilization

Involvement of the shoulder joint occurs mostly in adults and the dry form, caries sicca predominates The humeral head early loses its contour from cartilage damage, but since the joint is not weight bearing, actual bone loss is slight Fibrous union develops early which further protects the joint This fibrous union is never stable, and even though the shoulder is treated with the arm in abduction, once the support is removed, the arm gradually sinks to the side Since this fibrous union is not stable, there is little value in trying to obtain functional position of the arm by conservative treatment An abduction splint is cumbersome and uncomfortable to wear and there is nothing gained by its use, since operative fusion will have to be done in any event These shoulders should therefore be carried in sling supports during the acute stage and then fused

In the knee as in the hip, the late results of conservative treatment have not been good and as in all weight bearing joints, reactivation is liable to occur when unrestricted use of the leg is permitted Fusion will have to be done in practically all except the few in which synovial involvement alone has been found In performing the fusion, a complete synovectomy should be done and all of the diseased bone removed except where the destruction involves the growth center In the few cases where the growth line has been crossed as little further damage as possible should be done If this growth line has not been invaded, care should be exercised to avoid any damage to it Some authorities advise operation after the sixth or eighth year of age Others suggest waiting until 10 to 12 years of age If possible I prefer this later period since there is less danger of damaging the epiphyseal cartilage

Of the various operations for fusion of the knee, those of Key, Henderson and Putti may be briefly discussed Key uses a sliding graft from the tibia [illegible] into the femur [illegible] position of the femur on the tibia is [illegible] by through [illegible] pins joined [illegible] buckles [illegible] can be tightened [illegible] the desired amount of apposition [illegible] ported [illegible] Henderson [illegible] cartilage of the patella and [illegible] a raised [illegible] the femur and tibia. The tibia and femur are also transfixed with nails, which are later removed. Putti[17] also uses the patella as his graft, inserting the patellar tendon lower down on the tibia.

In children, arthrodesis of the knee in full extension is performed since sufficient flexion will occur later with use. In adults the knee should be fixed at 160 degrees.

If x-rays show no bone involvement in a hip joint lesion, conservative treatment in the child may produce a functioning joint. Earlier in this paper mention was made of nonoperative results, and the statement was made that conservative treatment, in weight-bearing joints, had not produced satisfactory permanent results. This does not preclude conservative treatment in the young child. A satisfactory result may be obtained, but even if not, such conservative treatment may carry the child along to the age when fusion may be performed more satisfactorily. Some authorities say fusion of the hip may be done after four years of age. I prefer to wait an additional two years. In fusing the hip the joint should be maintained at 160 degrees extension and 20 degrees abduction. This 20 degrees abduction aids in forcing the graft into the femur and ilium and permits better clearance of the foot in walking.

While interarticular and extraärticular fusions are spoken of, it is questionable whether a true extraärticular fusion is ever done. Most authorities feel that the joint area is entered to some extent in either type of operation.

There are many types of operations for arthrodesis of the hip with as many modifications. Reference to the work of Hibbs,[18] Wilson,[19] Henderson,[20] Ghormley,[21] and Albee[22] will give a detailed description of the methods used by these authors. The presence of an abscess does not appear to be a contraindication to operation either in the limbs or spine. Fusion will occur in the presence of pus.

Nothing seems to be gained by conservative treatment in sacro-iliac lesions. There is no joint function that must be retained, and the disease tends to burrow forward. Fusion, therefore, should be done early. If an abscess is present, it should be evacuated and the space curetted out thoroughly. Campbell[23] describes an extraärticular fusion, cutting a gutter posteriorly and above the sacroiliac joint and inserting a graft, cut from the iliac crest, into this gutter. Others expose the articulation and destroy the joint space by curettage (Gaenslen[21]).

Fusion of the spine, although most invariably done, is not a cure. Fusion should be looked upon as an "internal brace" to protect the healing lesion from further damage. Guri[8] has pointed out that it requires five to seven years to produce sound bony block in the thoracic area. He considers conservative treatment (recumbency) for a period of from three to five years should precede the operation. Unless sound bony block is obtained, further flexion deformity of the spine may occur, and even further spread of the tuberculous process. In the adult, this long period of preoperative recumbency is practically impossible. Therefore, in the older patients, fusion is done when the lesion appears to have become quiescent. At least three, and better four, months recumbency after operation should be insisted upon, followed by external additional support by means of a Taylor brace until such time as there is x-ray evidence of solid fusion and bone block.

In the child, fusion of the spine can be done after four years of age if the general condition permits and if quiescence has been obtained, but the older the child, the better will the operative shock be borne.

Quiescence may be considered to have been obtained when the x-ray shows recalcification rather than destruction, with sharper cut edges of the bone. The sedimentation rate should have dropped or remained as a diagonal line within moderate limits without change for a period of six months. The elevation of temperature should have receded, and the general condition should indicate improvement.

Sound bony block is considered present when the x-rays show sharp, well-defined outlines, the bone density equals that of the adjacent vertebrae, erosion of the upper and lower surfaces of the conjoined vertebrae is absent, and no paravertebral soft tissue shadows are seen. As mentioned above, solid bony block occurs more rapidly and more frequently in the adult than in children.

Essentially, conservative treatment consists of recumbency, with an attempt to lessen the amount of flexion which has developed in the collapsed vertebrae The Whitman or Bradford frame is utilized until as much correction as possible has been obtained and the lesion appears quiescent A plaster of Paris body cast, such as the Calot jacket, is then applied and worn until bone recalcification and bone block has been established This is followed by the wearing of a Taylor brace for at least two additional years

Of the various types of operation to promote fusion in the spine, the Hibbs[25] and the Albee[26] have become standard The Albee is less time consuming and therefore may be preferred in young children or in patients in poor physical condition A combination of the Hibbs and Albee operation is more frequently the choice In cutting grafts from the tibia for use in the Albee fusion, care should be taken to avoid cutting the graft from, or too near, the crest of the tibia If the crest is involved, the structural strength of the bone is so weakened that fracture of the tibia through the area may occur While fracture through the donor site is rare if these precautions are observed, the future of the graft itself is not always secure Fracture of the graft in fusion of the spine occurs in about 7 per cent of cases[27]

It was stated earlier that amputation, except in the foot or ankle, was to be considered only as a last resort Since tuberculosis below the ankle level tends to spread, amputation may be the treatment of choice, especially in adults The saving in the time loss, plus the usefulness of the newer prostheses, probably warrant radical surgery

Tuberculosis of the astragalus, without involvement of the other bones, is often seen, the astragalus being the most common site of lesions about the ankle Where the astragalus alone is involved, excision of that bone should be done Astragalectomy frequently gives a good functioning ankle in the child with, of course, the resulting shortening in the limb In the adult, the result usually is poor Remoulding of the tibiocalcaneus articulation does not occur and an arthrodesis is invariably necessary

Complications have been briefly mentioned Where an abscess is easily reached whether in bone or soft tissue, it should be evacuated Curetting except in the sacroiliac is not necessary and may do harm The cavity should be packed several times with iodoform gauze to remove thick material or chunks of necrotic tissue When the cavity is as clean as possible suture tightly closed Drainage of an abscess either by incision or by aspiration is frequently followed by the formation of a sinus tract which becomes secondarily infected, resulting in prolonged and continued drainage Such chronic suppuration may produce amyloidosis with its attendant kidney and liver damage

In speaking of spondylitis, I mentioned that such paralyses as do occur clear up under conservative treatment in the majority of cases Laminectomy or other surgical interference to relieve the pressure symptoms, is rarely necessary

Considerable work is being done at the present time on the question of variations in strains of tubercle bacilli By this I do not mean differentiation between avian, bovine, and human strains, but variations within the strains themselves Not only must the general resistance of the patient and the virulence of the infection be considered, but the tubercle bacilli producing the lesion should be cultured to determine the presence or absence of fungus forming elements, and whether we are dealing with what is termed the rough or the smooth type In this connection, the work of the Trudeau Foundation should be reviewed, along with the work being done in this line by European laboratories

Furthermore, it is interesting to compare the attitude of British orthopedic surgeons and the American school in the surgical treatment of spondylitis The American school leans toward earlier operative fusion British surgeons feel they may be dealing with a different strain of bacilli since early fusion, in England, has not been as successful as in America During World War II we admitted a considerable number of British children to this country, and will probably admit more in the immediate future If any of these children develop signs of bone or joint tuberculosis this possible differentiation in strain will have a definite bearing on the prognosis and treatment. This factor must also be kept in mind where tuberculosis develops in any of the North American children who have been in contact with them.

There is another factor that also must be faced. That is, the return to this country of prisoners of war who were imprisoned by the Japanese. Some of these will be suffering from tuberculosis when returned to this country, and others may later show evidence of infection. Here, again, we may be faced with the necessity of a differentiation in strain or an increased virulence.

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Total Necrosis of Ectopic Spleen Following Chronic Torsion of the Splenic Pedicle

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ON May 25, 1947, we had occasion to operate on a patient with total necrosis of an ectopic spleen, the necrosis being the result of chronic torsion of the splenic pedicle.

The interest of this case spurred us to search such bibliographic literature as was available to us for a more complete study and explanation of the clinical picture.

We found that although numerous case reports were available of acute torsion of ectopic or floating, and of diseased and enlarged spleens, the phenomenon of chronic torsion is rare. After much searching only 3 cases *of chronic torsion were found · one* published by Ton-that-Tung and Meyer-May (1939); one by Catsaras of Athens in a woman (1928); and a similar one by K. Georgakakis and I Melissinos of Athens in a man, published in 1947 by the Greek Surgical Society. Doubtless other cases must have been reported which have escaped our attention, but unquestionably the syndrome of chronic torsion is much rarer than the acute

It is easily understood that during the initial stages of torsion a series of clinical symptoms become evident but escape the memory of the patient and are attributed to various causes completely foreign to the real lesion of gradual torsion. There is a chain of symptoms beginning with colic and followed by chills and fever due to the slow and partial twisting of the pedicle which causes pressure upon and then occlusion of the splenic vein with active hyperemia of the organ, increased volume of the spleen, small subcapsular hemorrhagic foci, transudation of serous or bloody effusion, adhesions to surrounding structures especially the omentum, thus creating a certain amount of drainage through newly formed capillaries. During this time the changing blood count escapes observation because the doctor will not think of torsion of the pedicle when the presence of ectopic spleen is unknown both to himself and the patient. Thereafter the organ remains in a state of semitorsion, causing no further symptoms.

If further twisting occurs the brunt will be borne by the splenic artery The lumen will gradually be blocked and clotting will ensue with the natural result of stopping the blood flow which in turn will induce ischemic necrosis of the organ The symptoms will be those described above (minus the serous or bloody effusion) and the concomitant hemorrhagic state of the gastric mucosa will remain

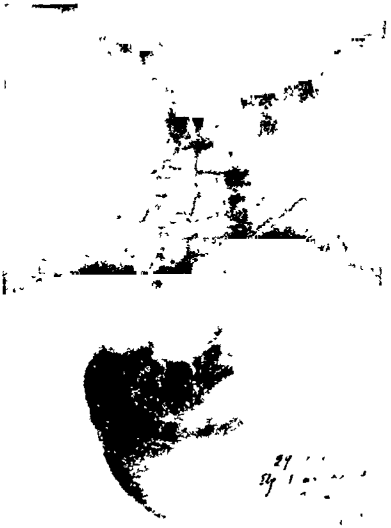

Fig. 1. Crescent shaped shadow in small pelvis.

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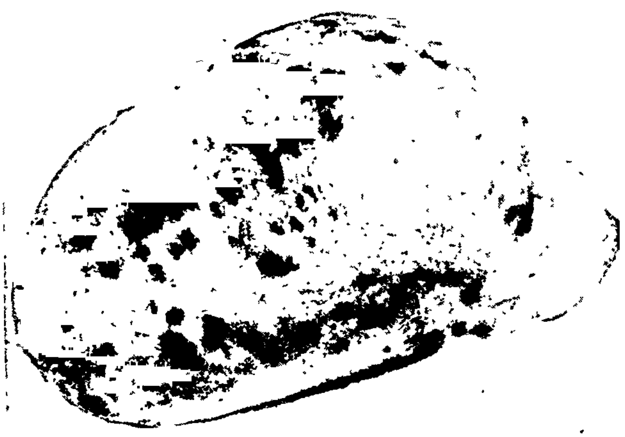

Fig. 2. Necrosis of ectopic spleen following torsion of pedicle. The first torsion occurred 16 years before operation.

unnoticed (Nanta). In short, the picture will not be that of an acute incident requiring immediate surgical intervention. Once thrombosis of the splenic artery is complete the following pathologic changes ensue as natural corollaries.

Numerous adhesions will be formed by the organism in the endeavor to enclose the dying organ and to protect the near structures. Gradually, by dehydration and absorption, the spleen will shrink very appreciably. The splenic function will then be taken over by the blood-forming cells contained in the marrow of the long bones and reflected in the return of the blood count to a more normal picture.

In the meantime the patient apparently will be keeping well but if he consults a doctor an abdominal tumor will be palpated, giving rise to various diagnostic explanations. An operation will be advised and the presence of an ectopic and necrosed spleen will be an interesting and unexpected surgical finding. This will happen or may happen to numerous ptotic or ectopic spleens.

Case. D. G., age 27 years. Admitted to hospital May 5, 1947, with a diagnosis of "abdominal tumor." Past family and personal history were essentially negative. The present illness started in infancy. He located by self-palpation and completely by chance a tender tumor in the left part of the abdomen. There were no symptoms. At the age of 9 there was an episode of chills and fever lasting four days. During this episode the tumor increased in size and seemed to drop lower toward the left iliac fossa. After this he remained apparently well and the size of the tumor gradually diminished.

In 1945 a similar episode occurred and for the same length of time. After recovery he felt well, joined the Greek Army as "completely healthy and fit," and has been serving as a combattant.

Examination was entirely negative except for the abdomen. Palpation of the abdomen revealed a tumor the size of a newborn infant's head, lying in the hypogastrium and extending into the lesser pelvis. It was smooth to touch, slightly tender and slightly mobile transversely. The shape did not suggest floating kidney or any other intraabdominal organ. A blood count showed white corpuscles 6,300, neutrophils 61 per cent, mature neutrophils with baton-shaped nuclei 2 per cent, lymphocytes 35 per cent, eosinophils 2 per cent, red corpuscles 3,950,000, Hg 80 per cent.

Tests of kidney function showed nothing abnormal. The possibility of a floating kidney or of a supernumerary floating kidney was considered but intravenous pyelography showed both kidneys in their natural position. A roentgenogram showed a crescent-shaped shadow of apparently homogeneous consistency lying in the small pelvis showing up

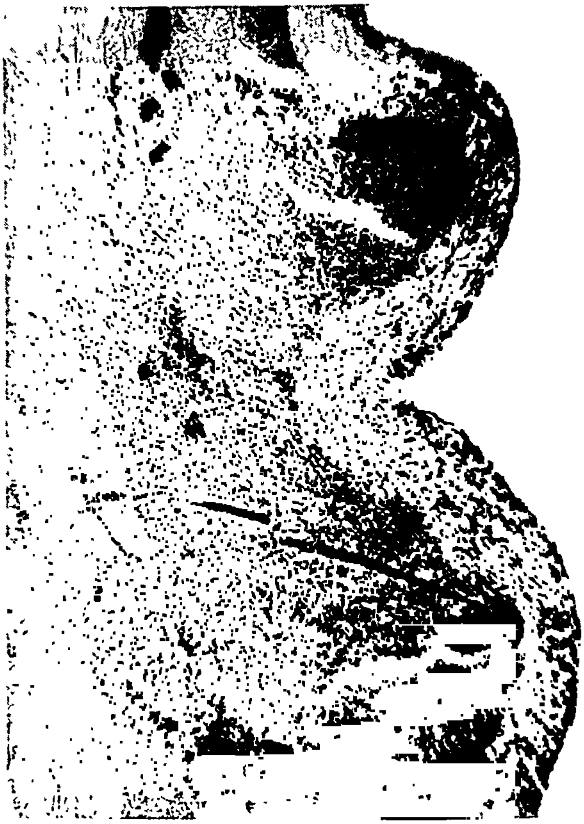

Fig. 3. Compensatory development of lymph follicles at the periphery.

above the pubic branches and in front of the lower sacral and coccygeal vertebrae (Fig 1) The eosinophile count plus a negative intradermal reaction of Casoni eliminated hydatid cyst Differentially, enlarged retroperitoneal or mesenteric lymph nodes due to lymphatic disease were excluded, as was also a tumor of the intestinal wall There were no signs of stricture of the gut, and a barium meal showed that the thick gut seemed to be sustaining pressure from outside, reacting with a spastic condition of the transverse and descending colon

On the provisional diagnosis of abdominal tumor an exploratory laparotomy was performed June 5, 1947

Operation Under ether anesthesia an incision was made from umbilicus to pubis Opening of the peritoneum disclosed an irregular round tumor as large as the head of a small fetus situated in the lesser pelvis and surrounded by intestinal coils adhering to the tumor in many places, the tumor adhered also to the sigmoid and posterior aspect of the bladder These adhesions were separated by blunt dissection After freeing the tumor a pedicle about ¼ inch thick was seen to lead from the tumor upward and to the left In following this pedicle upward with the index finger we found that at a distance of 15 cm the pedicle became thinner with a sinuous aspect and could clearly be felt pulsating The pedicle was ligated and the tumor removed Careful examination of the abdominal cavity showed no ptosis of any other organ and the splenic region was empty Drainage and partial suture of the parietes were done

From the operative findings and the history, it is clear that a floating spleen underwent two successive torsions, one at the age of 9 and one two years before operation The effect of the first torsion was the total obliteration of the splenic vein (passive hyperemia causing increase in size of the viscus) and that of the second was the obliteration and progressive thrombosis of the artery bringing about ischemic necrosis We should have considered this possibility The organ is shown in Figure 2

Pathologic Examination The spleen measured 13 by 7 by 7 cm and weighed 310 Gm The surface was generally smooth and of slightly reddish grey color In parts small nodules were apparent and there are zones of greenish yellow, reddish black and reddish blue hue Smaller isolated nodules and stains of the same color were seen on the otherwise smooth surface The fibrous sheath on the whole was thin and it was only on the spleen's inner surface, corresponding to the hilus, that thickening of the sheath was observed together with fragments of adhesions with surrounding tissues The consistency of the splenic tissue appeared to have undergone some induration

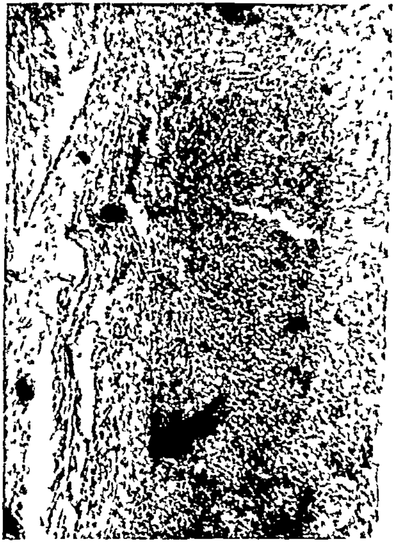

Fig 4 Compensatory hypertrophy of lymphoid tissue

After incision, examination of the sectioned surface revealed, immediately beneath the sheath, a narrow irregular zone of a light greenish yellow tint with variation in places to a golden or reddish grey color The splenic structure (as macroscopically observed on the healthy organ) had disappeared and only here and there the lumen of the blood vessels and a few fibrous trabeculae were visible The larger blood vessels were obliterated by blood clots The nodules situated on the surface appeared to be formed by normal splenic tissue proved histologically The presence of lymph follicles was noted This nodular tissue was peripheral and in the outside sheath Outside this formation a tenuous newly formed sheath was visible The splenic tissue formed small masses, in the center of which there are a number of blood vessels The rest of the pulp showed total necrosis with remains of bloody effusion Toward the limits of the necrotic area and especially under the sheath a comparatively large amount of hemosiderin was observed Circumscribed sclerotic foci were noted

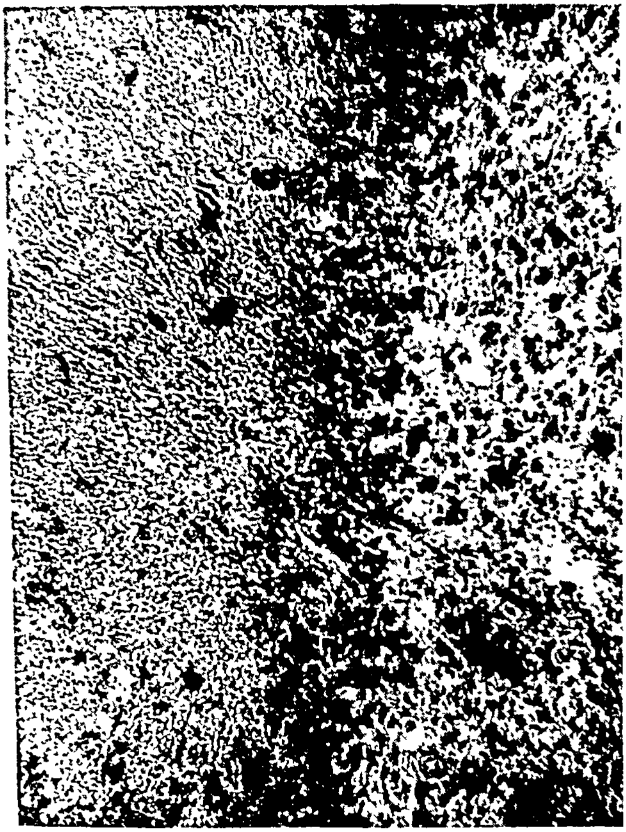

Fig. 5. Limits of necrosis with deposition of crystals of hemosiderin in the neoplastic connective tissue.

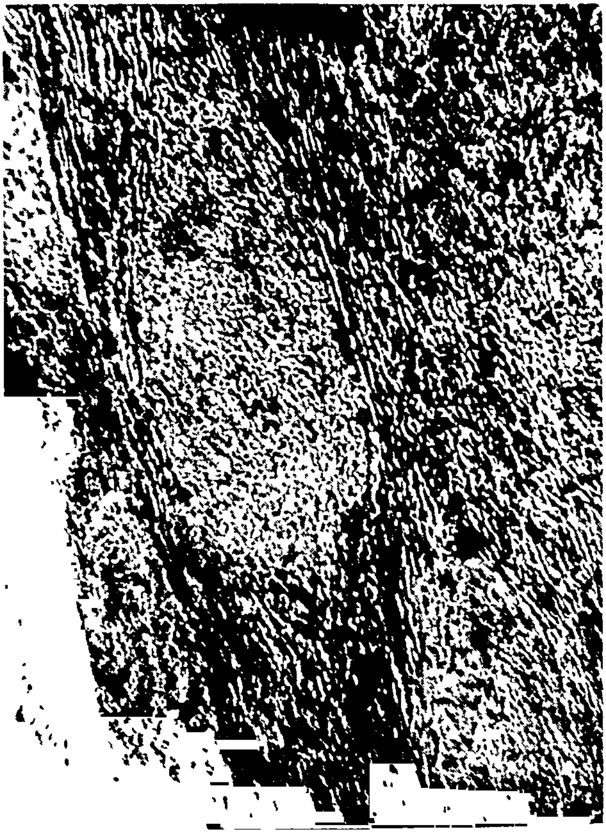

Fig. 6. Vessels with thickened walls. Connective tissue formation.

These foci were especially numerous about small arteries obstructed by necrosed thrombi. In some of these foci of induration there were still numerous connective tissue elements and lymphatic agglomerations.

Here was a case of total splenic necrosis caused by obstruction of the major blood vessels by torsion, thrombosis or some similar factor the nature of which could not be determined by pathologic examination. Necrosis did not affect all the splenic tissue at once. The tissue immediately surrounding the chief arteries seemed to have survived for a time, benefiting by a small quantity of blood still passing into the spleen, and a certain amount of connective tissue developed. These newly formed elements in their turn suffered necrosis when the blood stream was definitely suppressed. At the surface splenic tissue was formed, probably by capillary nutrition working its way through perisplenic adhesions. This newly-formed normal tissue gave rise to the surface nodules described.

The postoperative course was entirely uneventful. Twenty days after operation the red blood cells were 3,900,000, white blood cells, 8,400, Hg 80 per cent, color index 1.02. Blood platelets, 240,000. The differential count showed polymorphonuclears 65 per cent, lymphocytes 25 per cent, baton-shaped 3 per cent, large mononuclears 1 per cent, eosinophils 6 per cent.

The results show that no hematologic disturbance ensued (as is often present in splenectomy). This may be explained by the fact that long before the operation the spleen had not been functioning. The patient was discharged in perfect health on May 18, 1947.

DISCUSSION

In studying the case in question and following examination of the removed organ and the histologic findings it was established that on the surface of the spleen button-shaped growths were found. These growths had the color and histologic structure of a normal spleen.

This brings up a question of interest merit-ing the closest attention, that is, the question of compensatory new formation of splenic tissue.

Just as in our case we observed the buttonlike excrescences of splenic tissue, so in the case observed by Catsaras there was an even more marked development of splenic tissue in grapelike overgrowth covering the necrotic primary organ. Georgakakis and Melissinos also observed this compensatory production of splenic tissue with calcification of the splenic sheath.

This aptitude of splenic tissue to re-form is also proved by anatomic observation and experimental research. Beneke (as reported by Catsaras) in one case noted small tumors of splenic tissue scattered on the peritoneum and partly covering it. Four years previously this individual had ruptured his spleen by a fall and the explanation was that particles of splenic tissue had inoculated the peritoneum. Catsaras also mentions a similar case reported by Faltin. Kreuter grafted splenic tissue into the peritoneum and Lautenbach noticed that after splenectomy in which a small portion of the organ was left attached to the pedicle a new spleen was formed in six months' time which had a normal shape, volume and weight.

The logical interpretation of these facts apparently may be stated as follows: When *necrosis slowly but constantly* advances and satisfactory peripheral circulation is assured through newly forming adhesions, and where the necrotic process does not completely destroy the peripheral portions of the organ, there may be formation of new splenic tissue. This is not surprising if one considers the active formation of blood-producing tissue. Thus regeneration may partly compensate for slow destruction.

CONCLUSIONS

In clinical diagnosis of intraabdominal affections the possibility of an ectopic spleen should be borne in mind. Chronic torsion and total necrosis is extremely rare but not impossible. Compensatory regeneration of splenic tissue in chronic torsion brought about accidentally in man and experimentally in laboratory animals is an incontrovertible fact proved in the operating theater and the laboratory.

RIASSUNTO

Nella diagnosi differenziale delle sindromi addominali, un'ectopia della milza va tenuta presente. Torsione cronica e necrosi totale rappresentano un'evenienza rara, ma non eccezionale. Una rigenerazione compensatoria del tessuto splenico e' stata dimostrata accidentalmente nell'uomo, sperimentalmente negli animali.

SUMARIO

En el diagnostico de afecciones intra-abdominales se debe de considerar la posibilidad del baso ectopico. La torsion cronica o aun mas la necrosis total de este organo es bastante raro pero no imposible. La regeneracion compensatoria de tejido esplenico como consecuencia de la torsion cronica tanto en casos accidentales en el hombre o experimentales en animales de laboratorio es un hecho incontrovertible.

SOMMAIRE

Dans le diagnostique clinique des affections intra-abdominales, il faut songer á la possibilité d'une ectopie de la rate. La torsion chronique et la nécrose totale de cet organe sont très rares mais pas impossibles. La *régénération compensatrice des tissus spléniques*, due à des traumatismes chez l'homme et produite experimentallement chez les animaux de laboratoire, est demontrée d'une facon positive dans les salles d'opérations et dans les laboratoires.

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Surgical Lessons of World War II[*][†]

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IT HAS been rightly said that "there has been no staggering discovery in surgical technic in World War II." Nevertheless, several outstanding lessons were learned. Air transport of casualties, by shortening the time between wounding and adequate treatment, lowered morbidity and increased the survival rate. End results were better because trained specialists were brought closer to battle areas, whole blood and plasma were available earlier and in greater quantity, and rear-area treatment was more highly concentrated in maxillofacial, neurosurgical, orthopedic, burn and general plastic centers.

The availability of sulfa compounds and penicillin permitted more courageous surgery; but did not lessen the obligation to observe the established principles of sound surgical technic.

CASUALTIES AFLOAT

The Medical Officer aboard ship in World War I was confronted mostly with splinter wounds, lacerations and a small percentage of fractures as a result of shell fire during surface action.

In World War II, bombing being the commonest form of attack, flash burns proved to be the most frequent naval injury.

Mines produced rather "characteristic casualties, low in mortality but with prolonged disabling sequelae since fractures predominated." In areas immediately above the explosion os calcis fractures were most frequent, usually in stokers. On mess decks, fractured femurs and legs were in the majority; while on the upper deck, compression fractures of lumbar vertebrae and basal fractures of the skull predominated.[1]

Protracted bombing along certain convoy routes "rendered impracticable the time-honored precept that major surgery is not to be undertaken while action is in progress." In many cases amputations, laparotomies and other major surgery under general or spinal anesthesia had to be undertaken even though the future held every prospect of having to abandon ship.

Under wartime conditions, the use of cotton suture material aboard ship proved both practical and desirable. Because of transportation difficulties or the sudden influx of casualties, catgut was at times unavailable. Cotton thread in at least two sizes was usually obtainable from ship's stores or the sailmaker aboard most ships.

As pointed out by Keevil[1] the "question of internment of (the) severely wounded was a vexing problem and sometimes swayed the decision in favor of keeping them aboard until the nearest Allied port was reached."

AERIAL COMBAT WOUNDS

Wounds received in aerial combat occurred as a rule under more favorable conditions than those encountered by ground crews. Bomber crews were better able to maintain cleanliness of their bodies and their clothes. Bits of clothing and secondary missiles derived from the plane were relatively clean. In a series of 257 debrided wounds received in aerial combat in which primary suture was done, 95 per cent healed by first intention. Only 9 wounds became infected. Four others, thought to be infected, were opened but cultures proved negative.[2]

AIR TRANSPORT OF CASUALTIES

Although air ambulances were in use in the RAF since 1919, it was not until 1941 that a definite air ambulance organization was established. Air Marshall Sir Harold E. Cunningham,[3] in an address before the Inter-Allied Conference of February, 1943, stated that cases suitable for transport were to be assigned the following priority: (1) Faciomaxillary injuries. (2) Burns, after shock has been overcome. (3) Perforated wounds of globe of the eye, particularly those containing foreign bodies. (4) Fractured limbs and joint injuries (efficiently mobilized). (5) Head injuries, but not if unconscious or if breathing is affected. (6) Pelvic and spinal injuries, after encasing in plaster. (7) Empyema, after aspiration. (8) Tuberculosis of lung, but not if hemoptysis is present.

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[*] Read before the Sixth International Assembly, International College of Surgeons, Rome, May 16-24, 1948.

[†] The opinions expressed or assertions made in this paper are those of the author and are not to be construed as official or as reflecting the views of the Navy Department or the Naval Service at large.

Cases unsuitable for air transport were those suffering from (1) Shock. (2) Recent abdominal and thoracic wounds. (3) Acute abdominal conditions. (4) Recent severe hemorrhage, including hemoptysis and hematemesis (5) Gas gangrene. (6) Poisonous gases. (7) Lobar pneumonia or pneumothorax (8) Angina pectoris or coronary occlusion (during first month of condition).

BURNS

Coagulants and dyes were found to be far less satisfactory in the treatment of burns than sterile petroleum jelly, fine-mesh pressure dressings coupled with antibiotics parenterally administered with or without sulfa drugs.

As Keevil so aptly stated: "In a bombed ship and, I imagine, a burning tank or alongside the wreckage of an aircraft, it is not what is best but what is possible that must be considered. There is great and immediate need to treat the profound psychological shock of the patient still in flames."

Dye methods were abandoned because repeated applications were necessary, protection was inadequate, infection occurred too frequently and more attention was required than was possible at advanced stations.

Under field conditions, the burn patient in shock could be given substantial amounts of whole blood quite rapidly with perfect safety. Whole blood was found to be preferable to plasma in the treatment of associated shock and in the prevention of masked anemia. By increasing the availability of oxygen to the tissues, anoxemia was lessened and epithelial growth promoted Moderate to severe hemoconcentration was not considered a contraindication to the use of whole blood.

In the field, if anesthesia was unavailable, simple, sterile, emollient pressure dressings were applied, frequently over a fine frosting of sulfa powder. To minimize the possibility of poisoning, fluids were forced and oral sulfanilamide was withheld for the first 24 hours

On arrival at burn centers, high vitamin and high calorie diets plus early skin grafting made possible earlier restoration of function and earlier rehabilitation.

Burns treated in the manner described above were "approximately 14 days ahead of those tan treated, both in healing and function, and they were far more comfortable. The patient and his burn got to the base in such a state that subsequent treatment was not delayed for there was no adherent tan to remove, the burns were easily and immediately accessible, the caustic effect of the tan was eliminated, the joints were supple and mobile, and the young epithelium was healthier."

In the early years of the war much investigation was done by numerous medical officers at field stations and in the laboratories seeking to produce a wax-impregnated, sulfonamide preparation that would meet the peculiar requirements of forward area treatment of burns[4,5] In time, all such formulae were abandoned for the simpler and more satisfactory petroleum jelly pressure gauze dressing.

Good results were obtained from the topical use of sulfanilamide suspended in human plasma plus 2 per cent of tragacanth to provide bulk

In the field, skin contractures were prevented by maintaining full extension of joints Badly burned hands were best maintained in neutral position with moderate flexion of the fingers and slight dorsiflexion of the wrist.

THORACIC SURGERY

In the field, airtight sealing of "sucking wounds" by means of large bridging strips of petroleum jelly gauze dressings or a large oiled silk gauze pad and wide adhesive strip support lessened the incidence of tension pneumothorax, tension hemothorax and subcutaneous emphysema. This demanded priority over all other resuscitation measures in chest casualties.

At times, tension pneumo- or hemothorax was unsuspected because small "sucking wounds" had been closed by nature or had been sutured by an inexperienced medical officer unaware of the possibility of such complications in the presence of even a small penetrating or perforating wound of the chest.

Aspiration promptly revealed either retained air or blood present under increased intrathoracic pressure.

Packing wounds of the chest wall was contraindicated because it increased the tendency to infection.

In the presence of multiple rib fractures, cough and expectoration were often aided by intercostal nerve block. Morphine in full (though not excessive) dosage was not contraindicated.

Whole blood and plasma were not contraindicated provided the usual indications for transfusion were not transcended. Up to 2500 cc. proved safe.

The control of hemorrhage and the repair of associated abdominal injuries were at times urgently indicated *even before* full recovery from shock and the ill effects of the hemorrhage had been obtained. In some instances early surgery to stop bleeding and to close an open pneumothorax was the best treatment for the patient's shock. By first correcting pathologic physiology of the chest a patient was often enabled to undergo necessary abdominal surgery shortly thereafter.

Sellors[6] cited a case of "a pulseless soldier with an abdominothoracic injury producing a wide open pneumothorax. He appeared practically dead. Operation, however, including arrest of hemorrhage, splenectomy and much visceral repair, was completed with the pulse rate at 100 and the blood pressure over 110 mm. Hg."

Bleeding from lacerated intercostal arteries frequently stopped spontaneously. Tropea[7] reported that only 1 in 700 such injuries required ligation, the intercostal arteries usually being well thrombosed.

Prompt removal of intrapleural foreign bodies measuring over 1.5 cm. in two diameters, of jagged metallic and bone fragments, and of bits of cloth situated near vital structures minimized infection and prevented erosion into large blood vessels or into the esophagus.

Rib fragments and in-driven cloth and debris represented the greatest hazards in the production of infection. Small, smooth metallic fragments were well tolerated by lung and pleura. These were not removed early unless near vital structures. If associated with infection, removal usually became necessary in order to bring about healing of a draining sinus. When a foreign body was associated with a simple hemothorax, the latter was treated first. Some 8 to 10 weeks later, when maximum lung expansion had occurred, the foreign body was removed if its size warranted surgery or if a fistulous tract had developed.

Early and complete aspiration, *not sooner than 24 hours after wounding,* did *not* produce secondary bleeding and minimized the necessity for thoracotomy to remove a clotted hemothorax or to decorticate the lung.

Attempts to remove fibrin from the lung were abandoned if tears appeared likely. Persistence in such efforts was prone to lead to multiple fistula formation and to hinder later full expansion of the lung. In the presence of a sensitive organism, penicillin permitted decortication even if infection was already evident.

Hemorrhage ceased in the majority of lung wounds within 24 hours. Continued hemorrhage demanded urgent thoracotomy. As much as 3 to 4 or 5 pints of blood were found in the pleural cavity.

Daily, *airtight* thoracentesis, *without replacement of air,* followed by the intrapleural introduction of penicillin as practiced in World War II markedly reduced the incidence of empyema as compared to that noted in World War I. Up to 2200 cc. of hemothorax fluid was removed with safety at a single aspiration. Control of a hemothorax was usually complete after 2 weeks.[8] It was considered unwise to replace air deliberately as an aid to aspiration. According to Sellors,[6] such a procedure either prevented expansion of an already collapsed apex or else collapsed an already expanded apex, tending to produce a "potential total empyema if infection supervened."

If, after debridement, it was impossible to close the chest wall without too much tension, sliding muscle grafts were employed, bearing in mind the necessity for maintaining adequate nerve and blood supply. Where debridement of muscle edges was none too thorough, suture was done loosely. Thus, if infection appeared, the pus was more apt to drain outward than into the pleural space.

The time interval between wounding, casualty evacuation and admission to a hospital averaged from 8 to 12 hours A similar period elapsed before patients were sufficiently prepared for operation Yet save for those with uncontrolled bleeding such was the improvement after bed rest, blood transfusions, oxygen therapy and aspiration of the pleural cavity that the time spent proved worth while

Most hematomas of the lung absorbed with little or no symptoms When infection developed, blood stained pus usually appeared in the sputum and roentgenograms sometimes revealed a fluid level Even in the presence of a small foreign body postural drainage cleared up most of such cases Hence, according to Edwards[8] there was no indication for early surgery

Although the administration of ether with positive pressure or controlled respiration technic was the procedure of choice in all open cases as well as for exploratory thoracotomy local anesthesia combined with oxygen inhalation was used with benefit when intratracheal anesthesia or positive pressure apparatus was not available

CARDIAC SURGERY

Early removal of foreign bodies from the myocardium was rarely indicated Small ones usually did not require removal The removal of larger metallic fragments carried a mortality rate of less than 1 per cent Postoperative heparinization reduced intramural thrombosis

COMBINED THORACOABDOMINAL WOUNDS

Mortality from combined thoracoabdominal injuries ranged from 24 to 60 per cent The entrance wound was usually in the lower part of the chest The most common chest lesion was pneumothorax while those in the abdomen were laceration of the liver or spleen or of a hollow viscus

Tension pneumothorax of abdominal origin developed when air from a torn stomach entered the chest through a lacerated diaphragm In such instances it was imperative to repair the diaphragm before attempting any other abdominal surgery

A combined thoracoabdominal approach was not considered wise The left transpleural approach was used *solely* when the only abdominal injury suspected was an injured spleen It proved inadequate when bowel damage was present For suspected laceration of the liver a right transpleural approach was used The subphrenic space was drained by the intercostal closed method to minimize the possibility of thoracobiliary fistula formation with empyema Laparotomy was seldom indicated The chest surgery was limited, whenever possible to arrest of hemorrhage, debridement and closure of a ' sucking wound

In postoperative management whole blood was given liberally oxygen was administered for a minimum of 24 hours and diet adjusted according to the site of the injury In right sided lesions full diet was permitted 24 hours postoperatively except after exploratory laparotomy For left sided lesions nothing was allowed by mouth for several days Continuous duodenal suction was maintained Protein and fluid balance requirements were met, penicillin administered parenterally and vitamin C given in large doses

NEUROSURGERY

According to Cairns,[9] from 5 to 10 per cent of the casualties evacuated from the front lines were head wounds one third involving the face and eyes with many eye wounds penetrating the brain via the nasal accessory sinuses

Outstanding lessons in craniosurgery are cited below

Operations in the field were best limited to cases with large retained foreign bodies those bleeding actively or threatened with increasing intracranial pressure

Serious infection because of delay of 3 or 4 days in reaching rear area neurosurgical centers was minimized by early thorough debridement in the field, chemotherapy and penicillin An infection rate of approximately *30 per cent in World War I dropped to 15* per cent in World War II (Cairns)

Early air transportation of neurosurgical casualties proved to be safe Only 3 of more than 2000 head cases flown from Normandy to the United Kingdom died in transit[9]

Unconscious neurosurgical casualties were best transported lying on the side with head at body level, or in a semiprone position *never* flat on the back or face down, in which positions blocking of the airway was apt to occur. Altering the position hourly lessened the frequency of pulmonary collapse. Head cases did better if transported before than after operation.[10]

In cases of paraplegia, surgical interference with rare exceptions was limited to suprapubic cystotomy. Rubber air rings under the sacrum during transportation minimized the frequency of decubitus ulcers.

Penicillin made primary suture feasible in clean, incised scalp wounds. Penicillin plus air evacuation made possible a delay up to 72 hours of the primary definitive and final operation, permitting thorough wound debridement, primary two-layer scalp closure with or without closure of the dura.

Surgery in tropical areas, as in Britain's Burma-Assam Campaign of 1944[9] presented special problems. Mountainous jungle and difficult lines of communication often delayed arrival at neurosurgical centers as much as 4 or more days. Operations were performed at night because of the intense heat and humidity prevalent during the day. The latter interfered with surgery under local anesthesia because patients could not endure being draped for several hours, except during the period of the monsoon. Of 167 penetrating wounds 30 per cent presented frank pus on admission and a further 10 per cent showed it later.

Fibrin film, not necessarily sutured in place, served as an effective dural substitute and was considered a step forward in the prevention of meningocerebral adhesions.

No ill effects followed the repair of small defects such as burr holes (or openings up to 2 inches) by means of unsutured, stainless steel wire mesh placed between dura and skull and superficially to skull.

Tantalum foil neither corroded nor caused undue thickening of the dura and arachnoid. Little immediate or late tissue reaction was noted after the use of vitallium, ticonium or methacrylate grafts.

Dividing mobile neurosurgical units into forward and rear sections and combining these with maxillofacial and ophthalmological units proved highly beneficial.

Early ambulation reduced hospitalization and minimized posttraumatic syndrome.

PERIPHERAL NEUROSURGERY

In a clean field, early end-to-end, interrupted epineural repair with tantalum wire swedged on atraumatic needles (or the usual catgut) gave good results. In a questionable field, approximation or anchoring severed nerve endings with delayed primary wound closure proved preferable. Later visualization of the tantalum wire by x-ray helped locate the position of the divided nerve ends.

Suture of nerves divided under battle conditions was best done from 21 to 28 days after wounding. By that time the area of contusion is well demarcated from the uncontused nerve tissue, the Schwann cells are still highly active and the Schwann tubules are open for the reception of regenerating axons. Also, the epineurium has proliferated and its tensile strength is so augmented that it will more adequately hold a suture. Yet, earlier repair by primary union, despite the presence of some infection, was found to be feasible because of sulfonamides and penicillin.

Annealed rolls of sheet tantalum (0.00075 inch) did not crumple or fragment as did finer foil and gave better protection to nerve anastomosis under circumstances encountered in war injuries. In some instances the fibrin adhesive method proved highly satisfactory, its adherents claiming simplicity of application and a meritorious absence of extraneous materials or obstacles to growth in or between the nerve stumps.

Fibrin film, surfaced with fibrinogen, is derived from fractionation products of human blood plasma. As the fibrinogen clots it binds the film to the nerve's surface and takes up the stress of retraction from the nerve stumps. Besides maintaining apposition, it protects the nerve union by a continuous envelope.

In the presence of coexisting compound bone fracture and nerve injury definitive treatment of the fracture was best postponed temporarily on the basis that a paralyzed extremity was less desirable than a crooked one.

During transportation or after operation upon peripheral nerves, removable splints were preferable for immobilization.

PLASTIC SURGERY

Plastic surgeons definitely demonstrated that *early* skin grafts, made possible because of penicillin and sulfonamides, gave excellent results in the healing and reconstruction of burned areas.

The optimum time for removal of nonviable tissue and immediate application of either intermediate or full-thickness skin grafts was found to be between the second and third week after an extensive thermal burn. Though dissection was not simple and some viable tissue was invariably sacrificed, morbidity was markedly reduced and recovery came earlier.

In *cleanly avulsed* skin areas immediate skin grafting after adequate debridement lessened the occurrence of lowgrade infection.

In the repair of facial defects, improved function, color and softness followed the use of full-thickness grafts from the neck and clavicular regions.

In general, the tendency to excessive scar formation was minimized by the use of full-thickness and pedicle grafts

ACRYLIC EYE

In 1944 dental officers of the United States Navy began a search for more satisfactory ocular replacement materials.[11] Their pioneering in acrylic eye prostheses resulted in an appliance remarkably natural in appearance, light in weight, durable and easily manipulated The low thermal conduction coefficient insured comfort in extremes of temperature and protected against explosion during use. Furthermore, unlike glass, the acrylic eye is not etched and roughened in the presence of lacrimal secretions and is worn with comfort 24 hours a day

Complete and positive contact with all muscles of the ocular cavity provides a lifelike spontaneity and range of motion impossible in stock restorations

Oculofacial, unlike ocular prosthetics, lends itself poorly to standardized procedures. Individual problems present themselves and require special management In designing restorations and taking impressions at the Naval Dental School there is close coordination of ocular and maxillofacial prosthetic technics. The acrylic eye is processed first, and separately. Facial tissues in vinyl resin are then cast in a metal mold, and the two prosthetic parts are assembled.

These processes are time consuming and require many individual steps Shorter and simpler technics must be developed. Also, many more individuals need to acquire the necessary skill in order to supply sufficient acrylic eyes and oculofacial prostheses for the thousands in need of such improved replacements.

MAXILLOFACIAL SURGERY

The primary objectives in the field treatment of maxillofacial injuries were to maintain an adequate airway, treat hemorrhage and shock and to make the patient fit for early evacuation to a maxillofacial center

Acute obstruction of the airway was caused most often by (1) falling backward of the tongue, (2) loose fragments of bone, (3) blood clots, (4) broken dentures, (5) foreign bodies, and (6) traumatic deviation of the nasal septum.

Pulling the tongue forward by suture proved unwise. It hindered swallowing, thus increasing the tendency to inhalation of blood and debris.

Throughout nursing and evacuation, the *face down (prone) position* and facilities for emergency tracheotomy were imperative *musts.* Gillies,[12] stressing the importance of these, stated that "it can safely be said that over 80 per cent of deaths following maxillofacial injuries are due, at some time during their treatment, either to acute or chronic suffocation." He urged that stretcher cases be ticketed with either "You will kill me if you turn me over on my back" or "If I can see heaven, I'll soon be there."

Air sickness in those whose jaws had been fixed in occlusion proved no problem As pointed out by Dalling,[13] "one has yet to hear of a maxillofacial patient vomiting from air sickness, let alone any danger arising from such a cause," providing they were fed on a liquid diet and were kept in the *face down (prone) position.*

Primary healing in facial wounds was achieved in 3 days if repaired up to 48 hours after wounding. Cosmetic results were usually satisfactory though not as good as "cold scar correction" done under ideal conditions. Local penicillin reduced the incidence of suture infection and facial cellulitis in the region of major primary closures.

Where fractures were complicated by severe soft tissue burns, the bone injuries received primary attention, the burns secondary. Lacerations were left unsutured. Experience taught that it was most advisable to repair lacerations by excising the scar and suturing the resultant wound *after fractures had united and burns were "skin-healed."*

The majority of maxillofacial injuries incident to the operation of aircraft occurred in the middle third of the face and resulted in malar and nasomaxillary fractures with concomitant critical damage to the airways, dental malocclusion, enophthalmos and, at times, a permanent diplopia.

In nonunited, multiple and severely comminuted mandibular fractures cancellous bone-chip grafts plus penicillin and appropriate adequate fixation gave excellent results. So certain did bone grafting with medullary chips prove to be, that many felt it was justifiable to be more radical and "create more early bone gaps than was previously wise.[12]

Although some maxillofacial surgeons and dental officers continued to extract teeth in the line of fracture, many did not. The latter, relying upon penicillin to ward off infection, sought whenever possible to minimize trauma and to save teeth that were still attached to useful and viable fragments of bone.

In the field, when the defect was so large that direct repair of the skin and mucous membrane was impossible, minimal debridement, maintenance of airways, general supportive measures and *open packing* of the wound effectively prepared the patient for subsequent reconstructive surgery and the indicated prosthesis. Many preferred open packing to the procedure recommended by Gillies, namely, "suturing of the skin to mucous membrane around the marginal defect." Drainage, of course, was external and dependent.

Henry[14] reported 93 per cent returning to flying duty in 842 consecutive maxillofacial injuries due to flying accidents. As Gillies so aptly concluded, "the forward trinity of the neurosurgeon, the ophthalmologist and the maxillofacial surgeon did most excellent work."

CASTS AND FRACTURES

Unpadded, skin-tight casts were inadvisable during transportation of casualties. So, too, were windows cut in casts.

Voluminous dressings (such as bulk cotton) over wounded areas permitted edema and herniation of raw tissues beyond the skin surface.

Where plaster supply was inadequate, the inclusion of thin wooden or metal strips or segments of basswood splints soaked in water served to strengthen casts at points of stress.

Transportation in relative comfort without traction and its attendant dangers usually was accomplished satisfactorily by "pillow and sides" immobilization. Emergency traction hardly ever reduced fractures and late reduction was preferable to early reduction with possible pressure trauma. The "pillow and sides" immobilization was applicable even in fractures of the femoral shaft.

In the field where continuous observation was not always possible, clove hitch traction to the bare or booted foot was a risky procedure. Even though the ankle was well padded, frequent pressure ulceration occurred and extensor tendons sloughed. At times, isografts were required because of delayed healing. Amputation because of gangrene was always a possibility, the result of unobserved overtraction during transportation.

The most frequently employed field treatment for femoral fractures was the Thomas splint with Steinman pin traction. Aboard ship, immobilization in double hip spicas was preferred except for fractures in the upper third of the diaphysis. These were reduced by well-leg traction.

Hanging cast treatment was ideal for compound fractures of the humerus except in cases with extensive loss of bone or muscle in which a plaster body jacket was necessary.

Compound fractures of the calcaneus responded poorly to any measures other than immobilization.

Operative wounds for exposure of compound fractures were best left open

Knee joint infections responded best to posterior drainage and hip spica immobilization If the knee joint were exposed in the wound, results were better if the capsule or adjacent structures were closed skin closure being delayed for at least 5 days

Seventy five per cent of open battle casualty fractures closed within 6 weeks of wounding when treated by parenteral and local penicillin If complete suture were possible, closure occurred in 87 per cent[1]

GAS GANGRENE

The clinical picture of gas gangrene remained the same and early radical surgery continued to be the most important factor in the saving of life despite penicillin, sulfonamides antibiotics and rapid evacuation by air The previously established value of polyvalent serum and x ray therapy was confirmed

BOWEL SURGERY

The shortened time interval between wounding and operation increased the mortality rate of casualties with bowel injuries by bringing more of the severely injured to the operating room Shock and sepsis produced a mortality rate of 33 3 per cent when severe concomitant wounds were present[16]

In the management of possible extraperitoneal injury of the rectum, injury was presumed to be present even if the perforation could not be located if, "judging by the course of the missile, contusion or infarction of the rectal wall is presumptive or a large hematoma is noted[17] Immediate sigmoid colostomy lessened but did not prevent fulminating infraperitoneal infection This, in turn aided by fecal contamination of the infraperitoneal space was followed at times by a severe retroperitoneal sepsis Saucerization by coccygectomy and loose packing of the infraperitoneal space was life saving Persistent fistula followed in most cases if the rectal perforation remained unclosed

In a personal communication to the author Bacon and Vaughan[18] summed up their impressions of the advances in coloproctologic surgery during World War II as follows

'The improvement in technic and knowledge of the use of chemotherapy, particularly the stable enteric drugs The advent and ultimate common usage of the antibiotics The ability primarily to repair and anastomose lacerated or perforated bowel in a large percentage of cases without the necessity of exteriorizing the injured portion and subsequent secondary closure This of course, was made possible mainly through the use of chemotherapy and antibiotics and advancements in technic It has been shown recently that peritonitis developed, not so much from contamination at the time of injury as from continued soilage due to poor integrity of the repair and the anastomosis"

REFRIGERATION ANESTHESIA

Packing a gangrenous extremity with chipped ice and applying a tourniquet for 12 hours before amputation relieved pain, lowered temperature and transformed an emergency operation on a toxic patient into an elective operation on a patient in fair general condition"[19]

The tourniquet was best placed just above the knee, the skin incision being made proximally By freezing the skin to a point about 6 inches proximal to the proposed skin incision there was less tendency to necrosis of the skin flaps According to Perlow[19] the "circulating blood in the refrigerated tissue above the tourniquet does not alter completeness of the anesthesia nor unduly chill the body Vascular thrombosis was not noted, nor did sections of the femoral vessels show microscopic changes attributable to refrigeration"

Needless to say, all sponges used during operation were best moistened in cold sterile water Ice bags used postoperatively against the stump for several days diminished serous discharge reduced postoperative edema and prevented pain Healing time varied between 9 and 28 days[20]

VASCULAR INJURIES

Vascular casualties were less than 1 per cent[21] Vascular surgery progressed but little since World War I and, though the nonsuture vitallium tube heparin technic of Blakemore and his associates gave much promise in civilian surgery, it was of little practical value for routine use in the battlefield. As Odom [21] pointed out, most "aid-men in the field were unable to recognize injury to major blood vessels, and forward casualty-clearing stations were not set up for instituting the Blakemore technic."

Heparinization, furthermore, courted added dangers since bleeding from other wounds caused fatal hemorrhage in some cases. Griffith [22] found it safe to repair longitudinal wounds of main arteries without heparinization.

In a series reported by Odom, repair by suture, even when 50 per cent reduction of caliber resulted, was followed by gangrene in 38 per cent as compared with 57 per cent after ligation. He pointed out, however, that the repair series was smaller than the ligation series and that repair was used in what were primarily more favorable cases.

Too often, periarterial stripping, paravertebral blocks, repeated every 4 to 6 hours, or even preganglionic sympathectomy proved disappointing because of concomitant injury to collateral circulation. The latter resulted from pressure caused by hematomas following hemorrhage into fascial planes.

The time interval between wounding and repair of a major blood vessel was still too long (6 to 12 hours) and patients too often came to surgery exsanguinated, hypotensive, in shock and with anoxic tissues. Furthermore, preparation of vein grafts consumed too much time. In the future, perhaps, frozen vein grafts might prove valuable.

FOREIGN BODIES

Foreign bodies in constantly moving parts such as a joint capsule, or those imbedded among tendons as at the wrist, or in the movable structures of the neck, or if located in perineural tissues, were best removed early. This minimized disabling fibrosis and the consequent distal paralysis caused by fibrous constriction of the nerves.

Early removal of jagged foreign bodies located near large blood vessels avoided danger of erosion from motion or infection. Removal through an incision permitting withdrawal in a direction opposite to important vessels and nerves was occasionally necessary.

BLAST INJURIES

Traumatic lesions due to immersion blast or to tremendous air pressure caused by exploding bombs occurred mostly in air-containing organs. Though fractures of ribs and long bones were common, perforation of the tympanic membrane of the ear or genito-urinary injury was not often encountered.

Intestinal perforations occurred most frequently where air was pocketed in more or less fixed positions of the bowel. Late perforation resulted from secondary infection and ulceration of nonperforationg injuries such as hematoma or contusion of the bowel wall.[23] Air embolism was occasionally encountered.

The lungs were always injured with constantly associated hydropneumothorax. Hemorrhage and collapse of the lungs at times was massive. Fibrinous pleurisy and peribronchial pneumonia were common.

Rapid transfusion was contraindicated when lungs were damaged by blast. So, too, was general anesthesia in the repair of associated injuries.

Intercostal nerve block for relief of pain due to multiple rib fractures facilitated essential cough and expectoration.

Open operation and wiring of sternal fractures was rarely necessary.

Subdural hygroma (excessive fluid accumulation) produced symptoms varying from restlessness to stupor. Occasionally, the triad of headache, vomiting and papilledema mimicked brain tumor.[24]

REHABILITATION OF THE AMPUTEE

According to Kessler [25] the concept of rehabilitation in the treatment of the amputee was introduced during World War II. A series of coordinated activities, begun at the time of wounding, was continued at special hospital centers and prepared the amputee for return to society shortly after discharge from the hospital.

Daily discussion and participation in group activities with other amputees who were in the process of adjustment or were already playing a normal part in society developed a proper psychological outlook.

Surgically, conservatism was the keynote.

That there were only 18,000 amputations in more than one million American casualties was a tribute to the planning of the medical departments

The time tested open amputation was the technic of choice in combat areas The true guillotine was reserved for malignant infection or gas gangrene Otherwise, the skin and fascia cuff modification was employed making possible more rapid skin closure and reducing the necessity for skin grafting or wide excision of the scar at the time of revision

Military experience once again established the soundness of the four basic procedures for the average case, namely, the Syme's amputation at the ankle, the below the knee, the Stokes Gritti, and the above the knee amputations In the upper extremity the basic amputations employed were above the wrist, below the elbow, and above the elbow Disarticulation was avoided for prosthetic reasons

Measures to avoid contractures of the hip and knee and constant attention to exercising and shrinking the stump permitted earlier application of the permanent limb and minimized circulatory and neurologic complications

The four years of war produced 18 000 amputees in the American and many thousands more in the European and Asiatic armed forces During this period, 120 000 civilians in the United States of America lost limbs because of accidents or disease No comprehensive training program, except in isolated instances, has yet been set up for civilian amputees Lessons learned at military amputee centers may well serve as a guide for Civilian Vocational Rehabilitation

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Case Reports

Mucinous Carcinoma of the Abdomen

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THE status of mucinous carcinoma is somewhat confused. The terms colloid, mucoid, and myxomatous are indifferently applied to this form of cancer. Furthermore, pathologists consider it purely a degenerative process although it is difficult at times to demonstrate a primary lesion, and secondary nodules, where seen, show the same type of mucoid degeneration.[1]

It is certain that colloid is not a characteristic of these tumors, and "gelatinous" is merely a descriptive term, while mucoid means "like mucin," a condition which is more commonly seen in connective tissue. Mucinous degeneration, on the other hand, is a property of adenocarcinoma of the alimentary canal where most of these tumors are found. Saphir's[2] argument, therefore, for calling these growths mucinous, seems rather convincing. He points out that they are epithelial in type and show evidence of secretion in the specific tumor cell.

Despite these facts the outstanding feature of the case to be reported was a superabundance of gelatinous material obtained on numerous abdominal paracenteses. Nevertheless, true mucin was found on laboratory analysis of several different biopsy specimens taken at different times, and autopsy sections showed the presence of adenocarcinoma. The tremendous size of the growth, freedom from any observable metastatic lesion, and the length of time (10 years) the patient was aware of the tumor verify the pathologic description[3] that mucinous carcinoma grows slowly, becomes unusually large, infiltrates slowly, and metastasizes late, if at all.

CASE REPORT

A 51-year-old farmer sought medical advice because of an abdominal mass which had first been noted several years previously and which had slowly grown larger. The tumor was practically painless. Examination showed the abdomen to be distended by a very large mass which appeared to arise in the right upper quadrant and extend downward and over toward the left. The tumor was firm, painless, and nodular. At operation the abdomen was opened with considerable difficulty because of a large number of mucinous cysts adhering to the anterior peritoneal wall. Free mucinous material filled the peritoneal cavity and the entire parietal and visceral peritoneum showed evidence of seeding.

The patient recovered from the operation without incident, returned home and, having been informed that nothing much could be done, proceeded to put his affairs in order, disposing of his real property, farm, cattle, and personal things, selling them to his son. He was ready to die. Except for a gradual enlargement of his abdomen, occasional nausea, inconvenience from the abdominal weight, and distention, he felt quite well. Consultation with a local physician resulted in the suggestion of having an abdominal paracentesis. The patient was referred to me on Dec. 10, 1945, for this purpose. His abdomen above the umbilicus measured 47 inches in circumference. The size and outline of the tumor could readily be perceived, and permitted only a low midline tap (Fig. 1). This, however, failed to draw fluid, as the bore of the trocar was too small and the abdominal material too thick. The patient was then given a cycle of roentgen treatments consisting of 13 exposures of six parts and a total dose of 3,065 roentgen units.

On Jan. 7, 1946, a paracentesis procedure employing a number 10 trocar resulted in collecting 4 gallons of a thick yellow mucoid material not unlike lemon gelatin. A second cycle of roentgen therapy from Jan. 11 through Jan. 24, 1946, using the same parts and 2,650 roentgen units were given. A third cycle followed from Feb. 26 to March 5, 1946, with 3,180 roentgen units.

Subjectively the patient's condition improved. He returned home, bought back a small plot of land from his son, and went to farming. Three months later he presented himself for a second tap and at this time three gallons of similar mucoid material were removed. The tumor had definitely receded (abdominal circumference now was 41 inches) as outlined by palpation, apparently the effects of the x-ray therapy. His ascites, however,

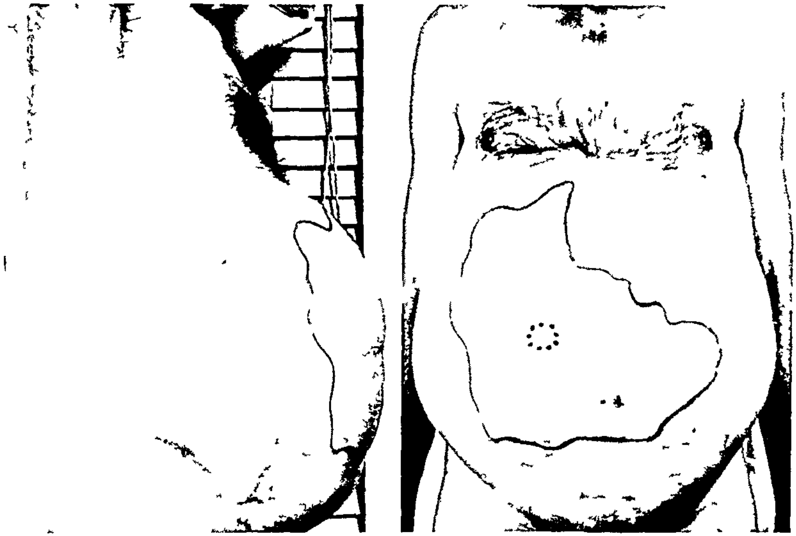

Fig 1 Photograph of patient 6 months before death Note size of tumor in outline the numerous tap scars and the two abdominal operative scars Dotted circle shows area to which cancer salve was applied Side view of tumor mass clearly demonstrates the abdominal circumference of 47 inches Distention of the superficial epigastric vessels is readily discernible

continued to accumulate, and on June 23, 1946, an exploratory operation showed an enlarged mass which appeared to be entirely replacing the liver, blocking off all access to the right upper quadrant The mass was fixed to the anterior peritoneal wall and extended down below the umbilicus Cutting through the tumor gave the impression of passing a knife through a dry firm sponge The mass ended sharply, however, dropping precipitously to the posterior peritoneal surface to which it was immovably attached The anterior peritoneum distal to the tumor contained numerous hard grapelike structures, some of which were scraped away and collected for biopsy The intestines were compressed flattened, and pushed toward the left Three gallons of the yellow mucoid material were again removed, and the abdomen closed in layers

The patient enjoyed relative freedom from distress for the next 12 months He worked his farm daily, and when his ascites accumulated sufficiently to hamper his movement, he returned for a tapping Each time from 3 to 4 gallons of fluid were removed He was tapped 5 times during this interval

Wearying of the constant needling and thinking he would not last longer than the fall, he allowed himself to be prevailed upon to consult a self-styled "cancer doctor in a neighboring state This person told the patient he would draw his cancer from the inside out and would establish cure simply by applying a salve to his abdomen Application of the ointment, however, resulted in a large necrotic area 10 × 10 cm over the abdomen just to the right of the umbilicus (see dotted circle in Fig 1) After several applications the patient stated that large quantities of the yellow fluid not only escaped from his abdomen but that he even vomited considerable amounts His abdomen then grew smaller and he felt better

Several weeks elapsed and the patient was advised to return to me for a tapping but was told not to permit the ointment dressing to be removed Examination at this time revealed the deep necrotic abdominal wound and ascitic distention The patient appeared weak He was advised nothing could be done for him by any ethical surgeon unless he consented to discharge the 'cancer specialist" This he steadfastly refused to do, saying he had paid for the treatments and was going to give them time since they seemed to have been doing him some good.

The patient left the hospital without therapy and the incident was recorded on the chart. His endeavor to engage someone to tap him was fruitless as long as he remained steadfast in his decision regarding the so-called cancer cure. Becoming daily weaker and his condition growing more precarious, he sought admission into a charity hospital where he was tapped and a de Pezzer catheter left in the abdomen.

The patient died after three weeks. At autopsy, a tremendous grossly infected tumor was found occupying practically the entire abdomen (Fig. 2). The bowels were matted together as in a colloid cast. Evidence of infection was widespread. The necrotic abdominal hole created by the cancer salve was large enough to insert a man's fist, and communicated directly with the abdominal cavity through the tumor mass. Death was attributed to toxemia, malnutrition, and generalized peritonitis complicating a myxomatous cyst.

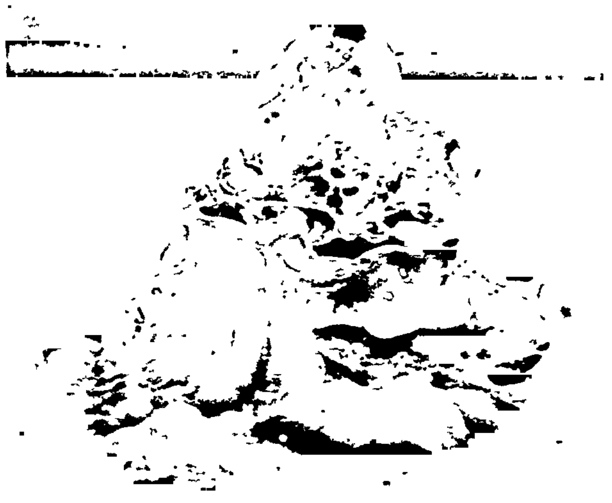

Fig. 2. Small section of tumor removed at autopsy showing spongelike consistency, and the thick mucus pouring from the cut surface.

COMMENT

The size of this tumor, even for mucinous carcinoma, is amazing. What the primary site was could never be determined. The mass appeared to be plastered to the anterior abdominal wall, embarrassing particularly the liver, limiting that organ to barely one-half its normal size. The lumen of the stomach and of the intestines was patent, and the patient never complained of constipation despite the severe compression which isolated the alimentary tract and confined it practically entirely to the pelvic abdomen.

The report from the clinic where he had first sought medical aid suggested that perhaps the tumor arose from the stomach but at autopsy that organ was free of any complication. The patient had had an appendectomy 20 years previously but the cecum showed no evidence of the disease. The omentum, however, could not be identified, and perhaps was incorporated partly in the tumor and partly in the gelatinous cast overlying the intestines. Grossly the entire condition appeared to be a pseudomyxoma peritonei and was diagnosed as such until adenocarcinoma was observed in the autopsy sections.

CONCLUSION

A case of mucinous carcinoma is reported. Its large size, slow growth and absence of metastasis were unusual even for this type of tumor. The abundance of gelatinous ascitic accumulation was incredible, as was the credulity of the patient whose last days were shortened by the ministrations of a charlatan.

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Foreign Bodies in Penis, Urethra and Bladder

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MEDICAL literature contains numerous reports of foreign bodies in the male urethra and bladder, and some reports are available of foreign bodies in the penis. The latter, however, invariably are found to be the result of trauma. Up to the present time, after carefully searching existing literature, we have been unable to locate any accounts of foreign bodies in the penis which arrived there through the agency of the patient himself.

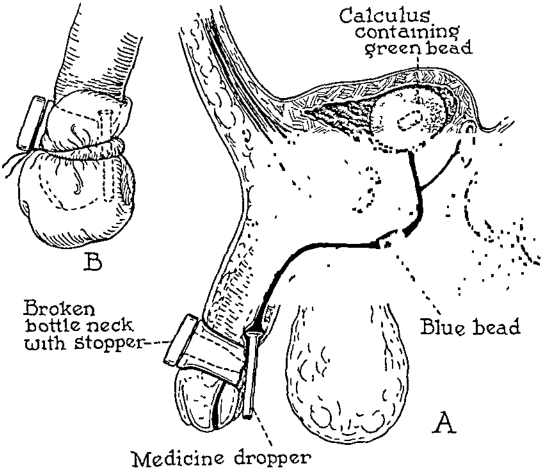
Calculus containing green bead
B
Broken bottle neck with stopper
Blue bead
A
Medicine dropper

Fig. 1. Median section of pelvic organs (1A) showing foreign bodies in situ. Lateral view (1B) of penis shows cloth in place and anchored to bottle neck by a string.

For this reason we believe the case which we are reporting to be unique in that it involves multiple foreign bodies in the penis, urethra and bladder. A glass reagent bottle neck, complete with stopper, was inserted through the dorsum of the penis including the urethra; a medicine dropper with the tip portion removed was inserted immediately proximal to the inserted glass bottle neck through an opening incised into the urethra by the patient himself; a bead was in the bulbous urethra and a calculus with a bead as its nucleus was in the bladder (Fig. 1-A).

The patient, aged 48, entered the Garfield Hospital requesting medical care and was placed on our service. He was obviously of low mentality, but harmful to no one but himself. His chief complaints were "dribbling," severe burning on urination, frequency of urination, and an occasional almost complete stoppage of urine. He stated that the burning had been present intermittently for a period of eight years, with interims of no ill feeling. During the past three years the symptoms had been more marked, and he attributed this to several attacks of influenza. A further more recent symptom was

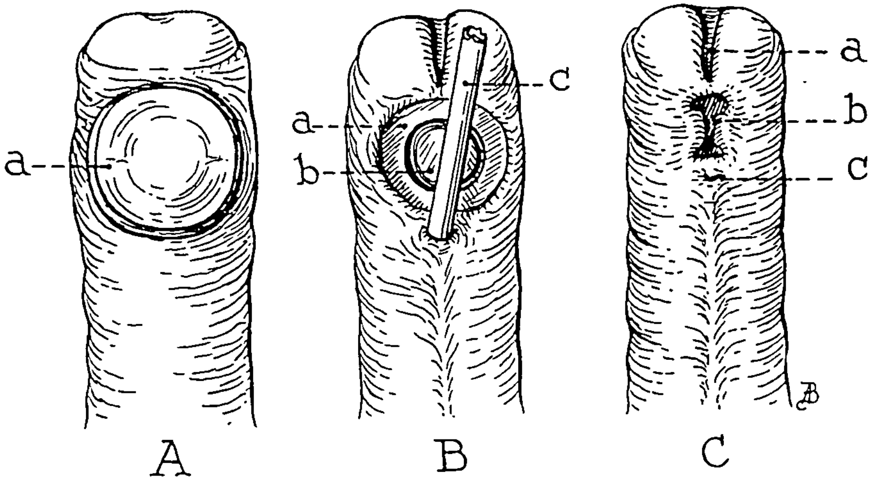

Fig. 2. In 2A may be seen the upper surface of the penis with glass stopper in view. On the lower surface (2B) may be seen the broken edge of bottle neck (a), end of stopper (b) and medicine dropper (c). Penis, lower surface (2C), original laceration where attempt was made to enter urethra (a), lacerated area at site of glass reagent bottle neck insertion (b), and the site of insertion of phlange portion of medicine dropper (c).

traces of blood in the urine, particularly at the last of the urination. There was difficulty in starting the stream, and the patient stated that at times he "had been catheterized." In view of the crowded condition of his penis, found on examination, it is difficult to see how he could have been catheterized by a medical man without some effort having been made to remove the objects. He was not an easy patient to question because of his low mentality, and the issue, therefore, was not raised.

His own diagnosis of the case was "cystitis," possibly obtained from some one to whom he had confided his symptoms. It seemed consistent with his complaints until physical examination. This revealed many carious teeth, large, embedded purulent tonsils, normal chest and abdomen. Genital examination revealed the neck of a glass reagent bottle, 3 cm. in diameter, broken off irregularly, the jagged end inserted at the junction of the glans and the body of the penis, and extending for approximately 2½ cm. through the entire body of the penis, including the urethra. The stopper, 2½ x 2½ cm., had been left intact and was inserted in the bottle neck. The urethra had been slit posteriorly for a distance of about 3 cm. from the external meatus. Undoubtedly the patient gave up this planned entrance to the urethra and later entered the urethra just proximal to the area where the bottle neck was inserted, and at this entrance a glass medicine dropper, ⅝ x 4 cm., was inserted. The dropper, with pointed end removed, was bound into the urethra by dense fibrous tissue, through which urine exuded. Further examination revealed a small hard bead, ¾ x 1½ cm., freely movable, at the level of the bulbous portion of the urethra and posterior to the medicine dropper. (Fig. 1A).

We questioned the patient as to the mode of entry of these foreign bodies and his intent in placing them in the genitals. He revealed that they had been in place for *four years*. The glass bottle neck had been placed in the penis by first making a slit in the organ. His idea in so doing was that it would serve as a "sort of mooring" to which a cloth might be attached and bound over the end of the penis to care for incontinent urine (Fig. 1B). At the same time he had placed a blue bead and a green bead in the urethra for the purpose of masturbation (Fig. 1A), and had inserted the medicine dropper to keep the urethra open so he could urinate. Finding only one bead, the blue one, in the urethra, we were satisfied that the other had slipped through the posterior urethral opening into the bladder (Fig 1A) since any other means of egress seemed effectively

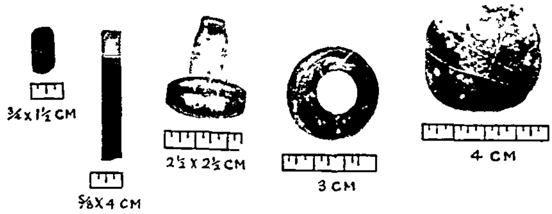

Fig. 3. Foreign bodies removed from penis, urethra and bladder, with measurements

blocked. The position and site of insertion for those articles is shown diagrammatically in Figure 2.

Urine examination revealed a neutral urine of specific gravity 1.010, with a trace of albumin and an abundance of pus cells. The leukocyte count upon admission to the hospital was 11,000.

The bottle neck with stopper and the medicine dropper were removed by incising the skin and scar tissue about these foreign bodies. A panendoscope was then passed to the bulbous urethra where the bead was seen, grasped with forceps and removed. The bladder was then examined through the cystoscope and a light grey calculus, about 4 cm. in diameter, was seen (Fig. 3). There was considerable acute inflammation throughout the bladder mucosa and some trabeculation in the fundus. Because of the size of the stone, a suprapubic cystolithotomy was done and the bladder closed about a catheter which was left in for drainage. After removing the stone a No. 24 sound was passed through the urethra but no stricture was noted.

Recovery was uneventful with the exception of a complicating epididymitis which developed two weeks after operation and subsided rapidly. The patient was dismissed from the hospital as cured on the thirty-second postoperative day. He was advised to return later for an attempt at plastic repair of the urethra.

Two weeks later he entered the office insisting bitterly that we had found a large stone some place else and had shown it to him with the statement that we had removed it from his bladder, and refusing to pay his bill on these grounds. We were morally certain that the green bead, inserted at the same time as the blue one and not found on operation, was embedded in the stone. We asked him if he would be satisfied that this was the stone removed from his bladder if we found the green bead inside of it. He replied that he would. In his presence the stone was cracked open, and tucked neatly in almost the exact center was the missing green bead (Fig. 1A). After due identification of the bead as the one he had placed in his urethra four years previously, he paid his bill and left the office, seemingly satisfied Nothing has been heard from him since.

COMMENT

The story seems well-nigh incredible, and we had the collection of trinkets carefully photographed as substantiation (Fig. 3). Not only was the patient's fortitude amazing in that he was able accurately to slice and hack at the penis with a razor blade and broken glass, but due to the vascularity of the organ it seems almost impossible that excessive bleeding would not at least have frightened him into seeking medical aid.

This is the only illustration we have been able to find, after painstaking research through the literature, of multiple foreign bodies in urethra, bladder and penis which were inserted by the patient himself. We would be deeply interested to hear a report of any similar case which might come to the attention of any of the readers of this article.

Placenta Accreta*

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PLACENTA accreta is a pathologic adherence to or invasion of the uterine wall by the placenta, with absence of the spongiosum layer of the decidua basalis. Stander[1] states that imperfect development of the decidua or excessive proliferative properties of the chorionic epithelium characterize this condition. According to DeLee,[2] the villi burrow into the uterine muscle and one sees irregular infiltrations of syncytium and Langhans cells.

Three types or degrees are recognized: First, in which the placenta is adherent but no invasion of the muscle occurs; second, in which the placental villi invade the uterine wall; and third, in which the latter is penetrated to the serosal layer and in which rupture of the uterus often occurs.

The incidence, according to different authors, varies from 1 in 2,000 to 1 in 40,000 deliveries, depending on the strictness with which the term is applied. It is believed that the diagnosis should be restricted to those cases showing the pathologic criteria of absent spongiosum layer with the villi adherent to, or invading the muscle layer of, the uterine wall. Kaltreider,[3] summarizing the literature in 1945, found that 177 cases had been reported. He believed that many more had probably been unrecognized, unreported or obscurely reported.

In all known cases, the etiology is related to previous endometrial trauma. Fibroid tumors, previous endometritis, postpartum sepsis, manual removal of a placenta, curettage and cesarean section, are all thought to be causative. A hormonal theory[4]—involving defective corpus luteum—has been suggested but not proved.

The symptoms of complete placenta accreta are silent. A case of retained placenta in which there is no bleeding or shock should make one suspect this condition. In partial placenta accreta, hemorrhage either moderate or profuse is a prominent symptom. Shock naturally supervenes if the bleeding is prolonged or severe.

In regard to treatment, modern authors mention manual removal only in condemnation. The mortality, according to Rademaker,[4] is 77 per cent. DeLee[2] states that the dangers include infection and rupture of the uterine wall. A conservative method[4] has recently been employed in a few cases: The uterus has been packed for 24 hours, and sulfonamides and penicillin administered. The placenta is eventually sloughed or absorbed and these few cases have recovered after a very stormy convalescence. This treatment violates the well-established principle that a nidus of infection should be extirpated. Uterine packing often will not control the bleeding in partial accreta. Also, infection not amenable to chemotherapy may be present.

Supravaginal hysterectomy remains the treatment of choice. Stander states that death from hemorrhage usually occurs unless hysterectomy is promptly done. If the case is seen in time, and properly prepared with blood transfusions, the mortality should be nil.

CASE REPORT

Nettie M., age 22, was admitted October 15, 1947, with the complaint of retained placenta and membranes. Delivery had occurred in the hogan* a few hours previously.

Physical examination revealed a well-developed, moderately well-nourished Navajo multipara in moderate shock. The temperature was 97.8° F., the pulse 100, respiration 28 and blood pressure 64/48. The conjunctival and buccal mucosae were pale, the heart rapid and weak. A large rounded swelling was present in the suprapubic region, the tied umbilical cord was protruding from the vagina and moderate bleeding was present. The patellar reflexes were absent.

Previous hospital records showed the following: January 20, 1942, her first delivery, normal; June

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* [illegible] expressed in this article are those of the [illegible] constitute official statements of the [illegible] U. S. Department of the Interior [illegible] Eastern Navajo Hospital, Crown

* Crude Indian Hut.

12, 1945, diarrhea and enteritis, June 25, 1946, parturition with retained placenta The placenta could not be expressed or manually removed, but fortunately passed spontaneously 12 hours later On this occasion her blood pressure dropped to 70/30 and her red blood cells to 2 630,000 Parenteral fluids plasma and blood were given with penicillin for four days and sulfonamides for 11 days She left the hospital in good condition on the twentieth day

Hospital course on present admission She was given vitamin K and pitocin intramuscularly, the latter in two series of four doses each without effect The blood pressure dropped to 70/30 and the pulse rose to 140 The red cell count was 2 870 000, Hg 45 per cent, white blood cells 18 500 polymorphonuclears 80, lymphocytes 20 Because of difficulty in venipuncture an arm vein was cannulized and 500 cc of 10 per cent dextrose in saline given, followed by 500 cc typed blood and 500 cc plasma The blood pressure then rose 120/80 and the pulse fell to 100 An additional 2,000 cc of fluid intravenously containing 200 000 units of penicillin was given that night

On the basis of her past history of an apparent placenta accreta and because of failure of oxytocics and Crede maneuver in the present instance, a preoperative diagnosis of placenta accreta was made It was considered unwise to attempt manual removal because of the danger of rupturing the uterine wall

The next morning a supravaginal hysterectomy was done under monocaine formate spinal anesthesia The uterus was large and boggy, the uterine vessels were large and tortuous the adnexa appeared to be normal Sparing the ovaries the uterus was removed, the umbilical cord cut and the stump pushed into the vagina The cervix was frosted with sulfathiazole crystals and closed in the usual manner The peritoneum and abdominal wall were closed without drainage

During the operation 1,000 cc of blood were given and the blood pressure was 160/90, pulse 96 at the close

Postoperatively, 500 cc of blood and 1,000 cc 5 per cent dextrose in distilled water with 100 000 units penicillin were administered As there was some abdominal distention prostigmine three 1 cc doses was given at intervals of four hours Morphine sulfate gr 1/8 H was given one hour after operation and three doses of codeine sulfate gr 1/2 H over the next 36 hours The general postoperative condition was good

The next morning the blood pressure was 120/80 pulse 72 hemoglobin 70 per cent, white blood cells 20,350, polymorphonuclears 92 lymphocytes 8 The venous cannula was removed, soft diet and surgical fluids were given Further medication consisted of ferrous sulfate tablets 6 daily and penicillin 20 000 units at 3 hour intervals for five days The temperature rose to 103 4° F and 10 cc sodium sulfadiazine in 1 000 cc 6th molar sodium r lactate was administered subcutaneously The next day, sulfathiazole and sodium bicarbonate was started by mouth and continued for seven days

On the third postoperative day the temperature dropped to 100° F, but again rose to 102° F to become normal on the sixth postoperative day A vaginal smear on the fourth postoperative day showed gonorrheal infection for which the patient was treated Ambulation was started on the sixth postoperative day, sutures were removed on the tenth and the patient discharged in good condition on the twelfth postoperative day The final blood count was 3 790,000 red blood cells, 65 per cent hemoglobin 11,500 white blood cells, 73 polymorphonuclears and 27 per cent lymphocytes

Pathologic report from the National Institute of Health gave a diagnosis of placenta accreta Micro

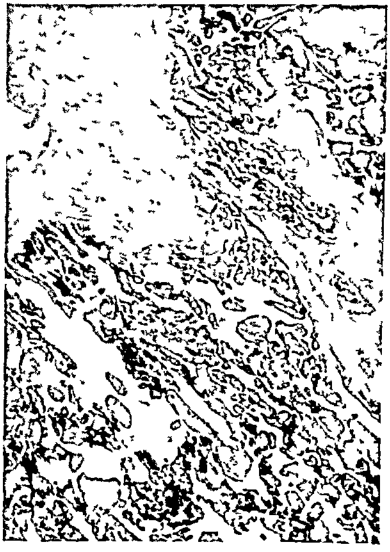

Fig 1 Section of uterine wall showing villus invading the musculature and showing the absence of the
courtesy of the
gnification data

scopically, "Lying next to the uterine musculature are numerous decidual cells. There is an occasional villus which lies next to the uterine musculature without any intervening decidua. There are no endometrial glands present. The placental villi are otherwise not remarkable (Fig. 1)."

COMMENT

While this is but a single case, it exemplifies several features usually found in this disease. Etiologically, it followed the endometrial trauma of a retained placenta in the previous delivery. The case reached the hospital in a state of shock which is typical of this condition. A considerable amount of blood was needed to replace that lost by hemorrhage. Penicillin and sulfonamides no doubt aided the favorable outcome. The patient was spared the risk of attempted instrumental or manual removal of the placenta and hysterectomy was done as soon as donors could be obtained and shock alleviated.

RIASSUNTO

Descrive un caso di placenta accreta, nella cui etiologia figura una lesione dell'endometrio successiva ad una ritenzione della placenta. La paziente venne ricoverata in uno stato di shock, tipico in casi del genere. Generose trasfusioni di sangue sono necessarie per sostituire quello perduto. All'esito favorevole contribuisce senza dubbio l'uso di penicillina e di sulfamilici. La rimozione strumentale o manuale della placenta offre un rischio troppo grave. Un'isterectomia, eseguita appena migliorato lo shock e l'anemia acuta, ha salvato la vita della paziente.

SUMARIO

El caso discutido aunque unico se ofrece como ejemplo para demostrar las varias caracteristicas de esta enfermedad. Etiologicamente, presento evidencia de trauma del endometrio resultante de retencion de la placenta durante un parto previo. El paciente entro al hospital en estado de shock que es una complicacion tipica de esta condicion. El paciente requirio grandes cantidades de sangre para replenir la ya perdida por la hemorragia sevara. La penicilina y los sulfonamidas fueron de gran valor en el tratamiento. No se trato de remover manualmente o por instrumentacion la placenta retenida; siendo el paciente operado tan pronto se combatio el shock y la anemia aguda. La histerectomia fue el procedimiento quirurgico que se practico en este caso.

SOMMAIRE

Ce cas n'est pas unique mais il démontre plusieurs aspects de cette maladie. Du point de vue étiologique, cette condition est secondaire au traumo-endométrial d'un placenta retenu d'une précédente grossesse. Le cas arriva à l'hôpital en état de choc ce qui est usuel dans cette condition. Il fallut une quantité de sang considérable pour remplacer celui perdu par l'hémorragie. La penicilline et les sulfonamides contribuèrent au résultat favorable. On épargna ainsi à la malade le risque d'enlèvement instrumental ou manuel du placenta et on fit une hystérectomie aussitôt qu'on eut les donneurs de sang et que la maladie ne fut plus en état de choc.

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Strangulated Paraduodenal Hernia Complicated by Volvulus

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ALTHOUGH many cases of paraduodenal hernia are reported in the literature. the following case in which the patient had undergone previous surgery, at which time no demonstrable defect in the peritoneal cavity was apparent. constitutes a less common surgical experience. Any report of paraduodenal hernia complicated by volvulus has escaped the author's investigation of comparatively recent literature. It is therefore assumed that this complication is at least very rare

No attempt will be made to present a review of these intraabdominal herniae. an excellent account of which may be found in pertinent literature As a basis for orientation. however. the following brief summary is offered.

Textbooks of anatomy generally describe five duodenal recesses There is considerable confusion in the nomenclature of the various fossae and their designation as possible precursors of hernial sacs. but Moynihan's designation of the fossa of Landzert as the predecessor of the sac of the left paraduodenal hernia, and the fossa of Waldeyer as the precursor of the sac of the right variety should suffice In recognition of the classical work of Treitz on the subject. the eponymic term often bearing his name is applied to these herniae

The relatively rare surgical incidence of herniae of the duodenal fossae is revealed by investigation of the literature The eight cases of paraduodenal herniae reported in a review of 39 cases of intraabdominal herniae at the Mayo Clinic (1941) over a 29-year period, is an example of one of the "larger" series. The very few yearly case reports published by individual surgeons usually number only one. Biermann's report of 3 cases (1945) being one of the few exceptions.

Left paraduodenal hernia is four times more common than the right. This is well illustrated in the series reported by the Mayo Clinic and also by the 2 cases of the right variety reported by the Lahey Clinic (1945) for a 19-year period which corresponds closely with the incidence reported in the literature

These herniae almost invariably are retroperitoneal, although intraperitoneal types have been reported by Paul and Hill (1938) and others.

The etiology is controversial. but the consensus leans to a postnatal development by a herniation of the intestine into preformed paraduodenal or retroperitoneal fossae (Iason, 1941). The condition is met with most often in the middle-aged male. although it is by no means rare in the female or the very young child.

The symptomatology. although referable to the gastrointestinal tract. varies from life-long episodes of abdominal discomfort and pain to that of sudden onset of symptoms associated with intestinal obstruction. The diagnosis therefore is rarely made preoperatively. Nevertheless. if the condition is thought of. and the clinical findings are significantly suggestive and properly evaluated. diagnosis of some of the cases may be made. as was done by Biermann in one of his 3 cases.

CASE REPORT

R. W., white female aged 24, was seen Oct. 7. 1947, complaining of severe colicky pains with nausea. but no vomiting. The attack of abdominal pain which had a sudden onset about an hour before caused the patient to faint. The pain was most intense in the region of the umbilicus and a normal bowel movement which occurred shortly afterward offered no relief.

The previous history revealed recurrent episodes of nausea and cramplike abdominal pains since early childhood. There was a normal pregnancy and delivery at 18 years of age. She underwent treatment for syphilis with subsequent negative serology (1942).

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In 1944 the patient was operated on by me because of tenderness and pain in the right lower quadrant and a history of menorrhagia. A laparotomy revealed a right polycystic ovary which was removed. The appendix showed no gross pathology, but was removed routinely. Further exploration revealed no Meckel's diverticulum or other intestinal abormality. The gallbladder was normal to palpation and there were no stones.

Recovery from this operation was uneventful, the patient remained symptom-free and normal menstruation was resumed. Her life-long bouts of abdominal distress, however, soon returned.

Significant findings in the physical examination revealed an acutely ill, apprehensive, well-developed and thin young white female. General physical examination was negative.

The abdomen was not distended, was moderately rigid with a definite area of tenderness over the umbilicus and extending to the upper left quadrant. A large, smooth, soft, fixed, spheroidal abdominal mass occupying the greater part of the upper left quadrant was distinctly palpable. The mass did not move with respiration and was tympanitic to percussion. There was no visible peristalsis nor borborygmus. The pelvic examination revealed nothing of a contributory nature. A flat plate of the abdomen was not remarkable. Owing to the painful condition of the abdomen no further examination was possible. The white blood cell count was 12,300 with 83 per cent polymorphonuclears, 15 per cent lymphocytes, and 2 per cent monocytes. A tentative diagnosis of intestinal obstruction was made and the patient was sent to surgery shortly thereafter.

The abdomen was opened with a modified left rectus incision exposing a moderately distended large colon and a remarkable lack of small intestine. The relatively small amount of intestine visible consisted of ileum. This was traced to the ligament of Treitz where the defect was found. A large globular mass the size of a football occupied the left upper quadrant. The mass was retroperitoneal and covered by smooth, white, shiny peritoneum. The ostium of the hernial sac was in the paraduodenal fossa at the duodenojejunal junction. About 12 inches of proximal jejunum had formed a loop twisted upon itself about 270 degrees and protruded forward into the abdominal cavity. The loop showed beginning gangrenous changes and was incarcerated in the fossa, firmly anchoring the protruding distal segment of ileum. The loop of bowel was untwisted and approximately 20 feet of small intestine were easily reduced from the retroperitoneal mass.

Complete obliteration of the retroperitoneal sac was not possible. The fossa was closed with interrupted silk sutures, and the edges of the sheafs of peritoneum were sutured to the duodenojejunal segment. Viability of the strangulated loop of bowel was ascertained and the abdominal cavity was closed.

The patient made an uneventful recovery. A gastrointestinal series two months later showed apparently normal anatomic relationships, and she remained completely asymptomatic to date (Feb., 1948).

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Rupture of Patent Thyroglossal Duct

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CONGENITAL cervical fistulas are sufficiently rare to merit report of a rather unusual case and its behavior may be of interest

These fistulas are of two kinds and for the sake of simplicity may be called lateral and median Embryologically the anterolateral portion of the neck is formed largely from the branchial or visceral arches four in number on each side connected posteriorly with the spinal column but at an early stage not uniting anteriorly with one another These arches are separated from one another by the branchial clefts also four in number on each side the fourth one being below the last branchial arch

The first or mandibular arch is concerned in the formation of the maxilla and is separated from the second arch by the first branchial cleft which is the only cleft remaining in the adult

The first branchial cleft persists as the exterior auditory meatus middle ear and eustachian tubes Irregularity in development may lead to the formation of fistulous openings usually found in the vicinity of the tragus

The lower three arches are concerned in the formation of the tissues of the neck The visceral clefts open internally into the pharynx, no communication of the pharynx with the exterior ever occurs for a delicate membrane divides the cleft into an inner (the pharyngeal pouch) and an outer portion (the so called branchial furrow) The lower three clefts normally disappear, only traces remaining in the pharynx and larynx

The third and fourth arches are small These are gradually overlapped by the second arch and lie in the depression known as the sinus cervicalis It is through the imperfect closure of this sinus that most of the cervical fistulas occur

These are narrow epithelium lined tracts opening externally near the anterior border of the sternocleidomastoid muscle When complete they open internally into the pharynx (in Rosenmueller's fossae) If the internal portion of the branchial cleft fails to become obliterated while the outer portion is closed as normally a pharyngeal or esophageal diverticulum may occur Furthermore, if the cleft becomes closed externally and internally and an intermediate unobliterated portion persists proliferation of the epithelium may form a branchial cyst

These branchial cysts occur in the submaxillary and supraclavicular regions and at the borders of the sternocleidomastoid muscles

Median cervical fistulas are different from those mentioned They are the result of the nonobliterated thyroglossal duct This duct according to His is formed by the downward evagination of the hypoblast at the back of the anterior segment of the future tongue From the lower portion the rudimentary median lobe of the thyroid gland is developed the upper part being embryologically the ductus lingualis the lower part the ductus thyroidei Normally this duct closes leaving above as vestiges the foramen cecum at the back of the tongue below the cornu medium of the hyoid and various bursae

Pathologic features of the thyroglossal duct may be found in the form of cysts situated in the median line over the thyroid cartilage or, more important, as the presence of an accessory thyroid at its uppermost part on the back of the tongue

It becomes apparent therefore that congenital fistulas of the lateral and median varieties offer diagnostic difficulties in the presence of an inflammatory phlegmon of the neck and that care must be exercised to ascertain whether or not the lingual thyroid if found in conjunction with this inflammatory condition may not be the only active thyroid present Hence careful search must be made to recognize the absence of the isthmus or the reverse lest hypothyroidism ensue from the removal of this important gland Fulness and apparent lateral lobes on both sides of the trachea may only be misleading as they may prove to be parathyroids entirely devoid of any thyroidal function. With these preliminary remarks one may appreciate the dilemma with which we were confronted in the following case.

Case Report. The patient, female, age 44, came to me complaining of fulness in the neck, slight sore throat, fetid breath and a bad taste in her mouth. The two latter symptoms had been present for a number of years but lately some difficulty in swallowing had been added. She reported that since her girlhood a diagnosis of cystic goiter had been made on several occasions owing to the fact that none of the cardinal symptoms of the more active form of thyroid hypertrophy were wanting. Examination revealed a fulness such as seen in cystic goiters but uniformly distributed over the anterior portion of the neck. Palpation revealed nothing but a palpable mass without marked nodular outlines or hardness. The pharynx and larynx were negative except for the odor mentioned and a slightly edematous condition above the arytenoids. Temperature, heart and pulse were normal. The patient was treated expectantly and told to return for a basal metabolism test but before she could secure an appointment with the technician she returned, complaining of pain and swelling over the thyroid cartilage. The skin was then somewhat red over the area and tender to touch. She was sent to her home with instructions to use mouth and throat disinfectants and to keep an ice bag constantly over the inflamed area. Temperature was then 100° F., P.M. For several days the same treatment was outlined without any apparent change in her condition except that there was a little more swelling and that crepitus developed in the mass on the fifth day, her temperature having then reached 103° to 104° F., P.M. She took nourishment regularly, apparently with less difficulty than at the time of her first consultation. By the end of the seventh day, although apparently not very ill, her temperature rose to 105° F. in the afternoon, the swelling was more marked and she became partially delirious.

Diagnosis of a probably ruptured thyroglossal duct was ventured. She was sent to the hospital the following day and a median incision over the thyroid cartilage down to the hyoid bone was made from which several ounces of pus, cheesy material and gas were evacuated. Probing revealed a channel above and below extending to the base of the tongue to a point below the hyoid bone. The cavity was irrigated with $K_2Mn_2O_1$ solution and carefully curetted, particularly above and below, including the hyoid bone with which it seemed closely associated. Finally the entire field was cautiously swabbed with carbolic acid and alcohol, packed and drained. The patient made an uneventful recovery, left the hospital on the eighth day. There had been no return of her former symptoms.

There seems to be little doubt, in my opinion, but this case presents all the features of a median cervical fistula of the thyroglossal type into which undoubtedly some food had entered, with probably an additional cystic content, all of which accounts for the findings at the operating table: anaerobic bacteria, pus, broken down tissue and putrefaction gas formation. There is also great probability that the forcible forward pulling of her tongue and the stretching of her neck at the time of her laryngeal examination and the palpation necessary to outline the different structures of the neck may have ruptured the walls of an already much distended duct and accounts for the sudden phlegmonous inflammation that followed. There never was any trace of hemorrhage at any time during or after any examinations or local treatments.

Editorials

Relation of Vagotomy to Gastroduodenal Ulcer and its Psychosomatic Background

AMERICAN thought has accepted the importance of hyperacidity and hypersecretion in the pathogenetic origin of gastroduodenal ulcer. The experimental proof of the physiology of gastric secretion in relation to ulcer has established the concept that the status of gastric secretion in relation to ulcer is largely, if not entirely, neurogenic in origin and is the basis of ulcer.

In the past decade there has been a growing appreciation of the importance of the individual psychosomatic status in the mechanism of gastroduodenal ulcer. A defect in the stomach is objectively real to the internist, to the roentgenologist, to the surgeon, and to the pathologist. It is just as subjectively real to the patient because of its incapacitating symptomatology. There is no doubt that the strains and tensions of modern life produce mental conflicts which provoke changes of gastric function—increased motility and vascularity and decreased mucin formation —which are conducive to ulcer formation Fundamentally, the basic character structure of the individual produces emotional reactions which are of greater importance than the effect of any particular form of therapy. This affords a better understanding of the many conflicting and confusing manifestations of ulcer.

These physiologic concepts are also clinically sound. The realization that all of these influences are transmitted along neurologic pathways and specifically along the vagi has formed the basis for the present enthusiasm for vagotomy and vagus neurectomy. Even though a more certain complete division of all vagus fibers is more surely accomplished by a thoracic approach with somewhat more certain results, the abdominal approach is equally effective in more than 90 per cent of the cases, and has the added advantages that the ulcer site may be explored for the recognition of a possible malignancy, and that other procedures—specifically a drainage operation, such as gastroenterostomy—may be added if considered necessary.

Technically, the operation is not unduly difficult, the mortality is low in competent hands (about 1 per cent) and the pulmonary complications are not embarrassing. Because of the functional changes caused by interruption of the vagal impulses and which concern gastric motility especially, the postoperative management is usually prolonged

Vagotomy or vagus neurectomy has been carried out as the sole primary procedure, or secondarily after previous gastric operations of the standard types Good results have been reported by many groups from the best American clinics The most pronounced effects of the operation have been found in the younger group with duodenal ulcers who present, in varying degree, other signs of nervous tension and instability

Complete vagus neurectomy has effected certain definite results

It relieves ulcer pain and is followed by healing of the ulcer. The relief of pain is found by most observers to be "striking"

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On the other hand, the Mayo group [9] find the relief "good" but not striking, and "inconstant, variable, and unpredictable otherwise."

There is a reduction in gastric acidity which seems to corroborate the neurogenic character of the hyperacidity and hypersecretion. Operation is followed also by reduction and possible disappearance of any hypermotility. Both of these functions in the satisfactory cases return to a normal status at the end of the first year. After subtotal gastrectomy and simultaneous vagotomy, gastroscopy shows edema, erosions, hypertrophy, and friability in the residual stomach. In any case, the clinical well-being of the patient seems to outlast the duration of the early secretory and motility changes.

In the primary vagotomy or vagus neurectomy cases, between 85 and 90 per cent have good subjective results for periods up to 30 months postoperatively. In half of these, however, the results are not as good as in the others. In the series of thoracic vagotomies reported by Grimson *et al.*,[3] completely satisfactory results were obtained in only 25 per cent of the cases. About 10 to 15 per cent of the cases have frankly poor results either with a demonstrable recurrence, or symptoms of ulcer. A similar number have severe side effects. Similar results have followed in cases with gastrojejunal stomas.

The distressing side effects and/or unsatisfactory results are due to: (1) vomiting during the first several months; (2) hematemesis; (3) melena; (4) recurrent severe abdominal pain and distension; (5) fulness after eating; (6) temporary or continuous foul eructations; (7) continuous or periodical looseness of the stools; and (8) serious diarrhea.

The greatest difficulty has been the occurrence of cicatricial, or postoperative relative obstruction, the latter due to incoordination in the pyloric sphincter. There is necessity for a secondary gastroenterostomy in about 10 per cent of the cases in the first three months after operation. The remark must be well taken, however, that the latter procedure is effective for the obstruction but equally ineffective as a means for avoiding other side effects of vagotomy.

The immediate combination of vagus resection and gastroenterostomy in cases with cicatricial obstruction (Moore, *et al.*,[7, 8]), and of vagotomy and excision of the ulcer-bearing area (Mayo group [9]), does not seem to be indicated. In the Johns Hopkins group,[1, 4] on the other hand, the results were uniformly satisfactory when some such additional procedure was practiced in addition to the vagotomy. Such contradictory statements are somewhat difficult to understand.

One must agree with the conclusions of the Mayo group, that if lasting and persistent good results could be assured, vagotomy or vagus neurectomy would offer an easy and comparatively safe method of treating certain peptic ulcers, especially recurrent ulcers. But if one is to employ this procedure in the management of gastroduodenal ulcer, the position of the Lahey Clinic [10] for the present seems sound: "To make use of it in secondary operations in a patient who had had a subtotal gastrectomy and then had a recurrent jejunal ulcer, the reasons for this being that even though atony in the remaining stump is produced, there is still good drainage as there is no contracted pylorus to produce obstruction; in addition, the technical difficulties of a second subtotal gastrectomy in the presence of a jejunal ulcer can be considerable." They also employ infradiaphragmatic vagotomy in most of the patients upon whom subtotal gastrectomy is due for duodenal ulcer in the hope that, by means of this, they can possibly cut down the incidence of gastrojejunal ulcer and recurrent bleeding. Their third suggestion is "to reserve any cases of duodenal ulcers in which vagotomy is to be employed to any in which it would seem unlikely, that, with the healing of the duodenal ulcer, pyloric obstruction would occur and gastroenterostomy become necessary." Unfortunately, such a condition cannot be predicted accurately.

The comment of Moore *et al.*,[7, 8] and of the Lahey group [10] should be well taken that when vagotomy or vagus neurectomy is combined with other operative procedures—e.g., gastroenterostomy, resection, etc.—the correct interpretation of the therapeutic effect of the former becomes confused. It becomes impossible to attribute the success of the operation to vagus resection alone since good results have previously been obtained with the other operations alone.

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The available facts suggest strongly that any prolonged relief which this surgical procedure confers upon the patient is due to some more subtle effect" which is "traceable to severance of those nervous pathways which communicate the patient's adaptive reactions from the brain to the stomach." After resection of the nerves such impulses cannot reach the stomach. In any event the necessity for repeated physiologic tests to determine residual vagal innervation is clear in order to make sure that no other reason is present for any nonsuccess of vagotomy or vagus neurectomy.

Finally a word of caution seems necessary. The complete relief of pain after vagotomy is not an unmitigated blessing and is fraught with danger. Recurrent ulceration, perforation and obstruction become difficult to recognize. Such incidents have occurred as early as 14 days after vagus neurectomy and gastroenterostomy (Mayo Clinic,[9] Dragstedt,[11] Johns Hopkins group[4]).

At the present writing, the published reports indicate that the efficacy of this operation as a temporary or permanent alleviating or curative and/or preventive measure is not definitely assured. The potential dangers of the operation, the question of ultimated regeneration of the divided nerve and the late failures, are being emphasized more and more. It seems that the initial enthusiasm for vagotomy and/or vagus resection is growing less and less, and that, ultimately, perhaps, the operation will be restricted to very special groups of cases.

A. O. WILENSKY, M.D.

Inguinal Hernia

AGAIN the perennial hernia question is with us. This time it is tantalum gauze,[1] vitalium plate,[2] stainless steel wire,[3, 4] floss silk,[5] nylon darn,[6] plastic insert,[7] and a score of other modern materials which are being introduced in the repair of hernia. Up to now, when man tried to improve on the Creative Wisdom, *reductio ad absurdum* followed.

It seems apparent that something fundamental is missing in our thinking on hernias when we scurry around to find adequate materials for reparative work—the multiplicity of which declares the futility of the attack. Despite the fact that the morphologic architecture is well known, there is a woeful lack of understanding of the physiology of the involved parts.

Opinions as to the cause of hernia are as numerous as the methods of repair. Some believe the internal muscle covering of the inguinal ring is *the* contributor to the formation of hernia; others believe the cremasteric muscle is more responsible; still others cling to the conjoined tendon. Lately there are those who consider Cooper's ligament and the ramus of the pubis as the essential mechanism in the making of a hernia. Hence in the repair of the defect, any or all of these structures are utilized as the fundamental basis of the reconstruction. The proof of the validity of these tenets rests in the recurrence of hernia after such a repair has been done.

When apposition of the anatomic parts has been completed their permanent status depends less on the surgeon's morphologic viewpoint than upon the mechanical devices with which the parts have been apposed. Again the suture material is blamed for deficient physiologic knowledge. All of us remember when kangaroo tendon, fascial strips, black and white thread were resorted to in smug security that the problem had been solved.

To the surgeon's chagrin—they failed. Now the trend is to better and stronger—if stranger agents. The success of which awaits the scathing hand of time. So is it any wonder that the English seem frustrated over the hernial situation?[8] Confidence has been lost in any method of hernial repair that goes under Bassini's name.[9]

Appraisal of the structures of the inguinal canal and their relation to the formation of hernia has been recently illustrated in a number of articles.[10-11] It has been shown that the first line of defense in preventing the formation of a hernia is an intact transversalis fascia.[12] It is only reasonable then to assume that the fundamental structure in the repair of hernia and the basic approach to its reconstruction should be the same fascia.

An opening in the transversalis fascia will permit any abdominal viscus to escape. Suturing of the defect will insure against escape, permanently and physiologically, more than any blocking-the-hole device which ingenious man is capable of assembling. However attenuated the transversalis fascia may be, it is still resilient enough to permit mobilization and this should be attempted always before resort to implantation of foreign matter in the body.

It is more important to direct thought to natural morphophysiologic procedures than to the designing of impractical materials as a restraining force. It seems that the surgeon here is reaching after feats in surgery rather than surgical features

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The evaluation of the various procedures recommended for radical cure of hernia can only be ascertained by submitting a definite series of cases, independently, to either the various suture devices now in vogue, or to the anatomic reconstruction of the transversalis fascia Time and unbiased recording will settle the question of the merits of each method

Stephen A Zilman, M D.

Sección en Español

Parto Indoloro. Raquianalgesia Obstétrica, Técnica de Parmley-Adriani*

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SUMMARY

Parmley-Adriani's nupercaine saddle block analgesia was employed in 30 obstetrical cases. Selective spinal obstetrical analgesia (the term suggested for this type of saddle block) is effective and relieves pain during labor and delivery. It was successful in 100 per cent of the cases studied. The procedure does not alter the normal course of labor, has no effect on the normal delivery of the placenta, does not induce asphyxia neonatorum nor produce significant arterial hypotension. The normal course of the puerperium is not affected. In some patients the procedure causes a fairly intense postpartum headache. To date, selective spinal obstetrical analgesia with nupercaine may be considered the best method for obstetrical analgesia in normal cases.

EN MAYO del presente año uno de nosotros (S. Varela) introdujo en México el procedimiento de raquianalgesia por soluciones glucosadas hiperbáricas.[1]

En una de las partes de dicho trabajo, el autor describió la técnica de Adriani-Román Vega para el "bloqueo en silla"[2] con la estadística de los primeros casos quirúrgicos realizados hasta entonces por él.

Esta comunicación se refiere solamente a las aplicaciones de dicho método en la práctica obstétrica.

En diciembre de 1945 los Dres. Parmley y Adriani presentaron en la Sección de Anestesiología del Congreso de la Asociación Médica del Sur, en Cincinnati, Ohio, E.U.A., 100 casos de parto indoloro obtenidos con la raquianalgesia obstétrica de "bloqueo en silla," basando la selección del procedimiento en consideraciones anatómicas, fisiológicas y fisiopatológicas.[3]

En efecto, el trabajo de parto puede realizarse sin sufrimiento físico apreciable de la mujer, cuando menos en lo que corresponde al estadío final del período de dilatación y al período expulsivo (equivalentes al primero y segundo tiempos del parto según la escuela Anglo-Sajona), si los nervios sensitivos que inervan el segmento inferior del útero, cervix, vagina, vulva, periné, recto, ano, y vías urinarias bajas, son insensibilizados por un procedimiento que produzca analgesia en esas regiones y que dará lugar, naturalmente, al bloqueo de los estímulos dolorosos del trabajo.

Estos estímulos, que concurren a los segmentos onceavo y doceavo dorsales de la médula, se transmiten por fibras simpáticas de los nervios de los plexos hipogástrico superior, medio e inferior, el plexo pélvico o útero-vaginal, el nervio ilio-hipogástrico y los procedentes de los ganglios simpáticos sacros y plexo del mismo nombre, inervación que sigue de preferencia el mismo curso que los vasos sanguíneos.[4, 5, 6, 7]

Hingson y Edwards han corroborado esos hallazgos en más de 600 casos en que precisaron bloquear el 11o. segmento dorsal de la médula y nervio ilio-hipogástrico, en ambos lados, para lograr la supresión completa de los dolores del parto.[8]

La inervación motora del útero procede de los segmentos dorsales superiores, probablemente del 4o. al 6o. y aún quizá de más arriba, y cursa a través de los nervios de los plexos

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celíaco, aórtico, renal e hipogástrico. La red nerviosa del cervix y de la vagina, procede de los ganglios simpáticos sacros y de fibras para-simpáticas del 2o. 3o. y 4o. nervios sacros Hingson y Edwards creen que estas fibras inervan el músculo circular del útero y el segmento inferior de éste, y que también llevan nervios sensitivos procedentes de esta zona y del fondo de la vagina, así como ramas inhibitorias para el útero, que se distribuyen en las fibras musculares longitudinales de este órgano.

La red nerviosa de los genitales externos procede del nervio pudendo interno (rama del plexo sacro) para la parte inferior de la vagina y de los grandes y pequeños labios y en parte de las ramas genitales del plexo lumbar Los órganos eréctiles y el perineo reciben inervación del nervio pudendo interno

De las técnicas de analgesia obstétrica conocidas, sólo dos realizan el desideratum expuesto anteriormente por el mecanismo nervioso-fisio-patológico que hemos citado Ellas son: la analgesia caudal contínua y la raquianalgesia obstétrica de "bloqueo en silla" motivo de esta comunicación.

Para que un procedimiento de esta naturaleza sea de utilidad en obstetricia, debe llenar otros varios requisitos además de la supresión del dolor: no disminuir la intensidad, ni retardar o suprimir las contracciones uterinas, ser inocuo para la madre y el niño tanto por la acción farmacológica y farmacodinámica de las substancias empleadas, como por la acción asociada de otros fenómenos como: hipotensión arterial, naúsea, vómito, etc.

Estamos enterados de que la raquianalgesia ha sido ya discutida en sus aplicaciones a la Obstetricia y que los tratados clásicos la han considerado como contraindicada y peligrosa, en el trabajo de parto.

Las razones han sido fundadas, pues hasta antes del advenimiento de la técnica de Adriani-Román Vega, no había manera de mantener la solución del analgésico en la parte terminal del canal raquídeo y no se podía controlar su difusión en el líquido cerebro espinal, pues la simple disolución de las substancias en 2 o 3 cc. de éste, no ofrece ningún obstáculo para que gran parte de la droga se disperse en el remanente del fluido actuando, como es natural, sobre raices nerviosas de segmentos superiores, determinando no sólo la supresión del dolor, sino la detención absoluta del trabajo de parto, poniendo a la parturienta al borde de graves complicaciones

Pero la aparición de la técnica de Sise para la analgesia raquídea, obtenida por disolución de cristales de Pantocaína en solución de glucosa al 10 per centum[8] permitió al anestesiológo mantener el volumen del analgésico al nivel deseado del canal, actuando sobre las raices nerviosas que precisa analgesiar según el acto quirúrgico que se va a practicar.

El autor de la nueva técnica de "bloqueo en silla" ha tomado la idea original de Sise pues disuelve la Procaína, Pantocaína, Percaína, etc., en solución de Glucosa al 10 per centum con objeto de obtener una mezcla francamente más densa que el líquido céfalo-raquídeo, es decir, logrando una mezcla hiperbárica para dirigir toda la solución hacia la parte terminal del saco dural y mantenerla ahí en contacto con los nervios sacros, por ciertas maniobras de posición del paciente y de la mesa de operaciones. La solución de glucosa tiene por objeto no sólo el de obtener una mezcla hiperbárica, sino la de retardar al máximum la difusión del analgésico, lográndose con ello una supresión del dolor mucho más duradera, en razón a un contacto más prolongado con las raíces nerviosas. Adriani ha logrado pues, con su procedimiento, eliminar todas las contraindicaciones y peligros de la raquianalgesia en Obstetricia, facilitando al obstetra las ventajas de un bloqueo sub aracnoideo selectivo.

METODO

El instrumental consiste en una jeringa de 2 cc., otra de 5 cc., agujas para raquia marca B-D del número 20 y de 3 pulgadas de longitud (8 cm.), pinzas para antisepsia de campo, ampolletas de Percaína de 2.3 cc. de solución al 0.5 per centum, ampolletas de cardiazol-efedrina y de sulfato de efedrina de 0.05 gm., ampolletas de Demerol de 100 mgm. ampolletas de suero glucosado al 10 per centum de 10 cc., más el equipo habitual como: compresas, guantes, torundas estériles, etc.

Previa toma de la tensión arterial, pulso, respiración, etc., se procederá a la raquianalgesia.

TECNICA

Primer tiempo. Estando la paciente en posición sentada se procede a la antisepsia de la región lumbar, con el dorso bien flexionado.

Segundo tiempo. Punción en el 4o. espacio inter-espinoso lumbar, con el bisel de la aguja hacia abajo.

Tercer tiempo. Inyección rápida de la solución analgésica que de antemano se ha preparado tomando medio centímetro cúbico de la Percaína (2.5 mgm.), al que se agrega medio centímetro cúbico de la solución de glucosa al 10 per centum.*

Es de particular importancia no inyectar la solución absorbiendo previamente líquido céfalo-raquideo ni practicando tampoco barboteo. Debe ser introducida directamente al canal con la rapidez prudente que permita el émbolo. Además no debe inyectarse durante la contracción uterina, porque en esos momentos la presión del líquido céfalo raquideo aumenta y ello puede hacer ascender el analgésico hacia segmentos superiores y facilitar la disperción de la solución, contribuyendo así al fracaso del método.

Cuarto tiempo. Inyección hipodérmica, en el región glútea, de una ampolleta de 1 cc. de cardiazol-efedrina si la cifra de la tensión arterial máxima es mayor de 120 milímetros de mercurio, o de 1 cc. de sulfato de efedrina en caso de que sea menor.

Quinto tiempo. Permanencia de la parturiente en posición sentada durante 40 segundos.

Sexto tiempo. Colocación de la enferma en decúbito dorsal dando a la mesa obstétrica una inclinación de 10 grados Fowler.

Hacemos notar que el método debe iniciarse cuando la dilatación del cuello sea de unos 6 a 7 cm. y cuando los dolores se presenten en intervalos de 4 a 5 minutos. Los originadores de la técnica proceden cuando la dilatación es de unos 3 ó 4 cm. Nosotros actuamos como se vé, un poco más conservadoramente.

El procedimiento ha sido ideado para ser seleccionado en casos deprimigestas o multigestas en que se espere un parto normal. Las indicaciones para casos distócicos irán haciéndose patentes conforme el partero y el anestesiólogo vayan familiarizándose con él.

Otro punto importante es el que se refiere a la medicación previa sedante que pueda hacerse necesaria.

Nosotros dividimos nuestros casos en aquellos que sí requieren una pre-medicación adecuada y otros que no la necesitan. Son de preferencia las primigestas en quienes la realizamos, en atención al estado de sufrimiento y excitabilidad nerviosa en que se encuentran durante el trabajo, y la hacemos con Clorhidrato de Demerol, en inyección hipodérmica, a la dosis de 50 a 100 mg., que se puede repetir al cabo de 3 a 4 horas sin inconveniente.

El Demerol[9] o isonipecaína, es un compuesto sintético del grupo de la piperidina, que posee una acción espasmolítica parecida a la de la atropina. Fué sintetizado en 1939 por Eisleb-Schumann y el gran interés que esta droga ha despertado, depende de que ejerce una acción similar a la Morfina sobre el sistema nervioso central, y tiene un poder analgésico y sedante que se compara al de aquella. En comparación con la morfina reduce apreciablemente la incidencia de naúsea, vómito, etc., y no posee ninguna acción depresora sobre el centro respiratorio; y contráriamente a la precitada, no interfiere con el reflejo tusígeno ni altera la dilatación de la pupila, ni produce constipación y es menos prono a la retención urinaria.

La isonipecaína es un polvo blanco, cristalino, ligeramente soluble en agua, de reacción neutra y de sabor un poco amargo; su sal más usada es el clorhidrato. Es destruido en el hígado y aún cuando el mecanismo de la detoxificación no es todavía claro, se supone que se verifica por un proceso de hidrolisis. Se elimina en pequeña cantidad por la orina y no produce efectos acumulativos en el organismo.

La dosis de Percaína inyectada produce una analgesia de 3 a 5 horas de duración. Si el trabajo de parto se prolonga más de ese tiempo no hay inconveniente en repetir la punción raquídea siguiendo la misma técnica que la descrita anteriormente e inyectando la misma dosis. Casos hay en que se hace necesaria una segunda y hasta una tercera inyección Sin embargo, en nuestros casos, la dosis inicial ha bastado para que el trabajo se desenvuelva sin dolor y se termine espontáneamente

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* Recomendamos un lavado previo de la jeringa con [illegible] suero con objeto de desembarazarla de las [illegible] que provienen de la esterilización [illegible] son causa de cefaleas, ligera [illegible]

La circunstancia de que el procedimiento consista en un bloqueo sub aracnoideo bajo y a dosis mínimas, no autoriza a violar las contraindicaciones conocidas y establecidas de toda raquianalgesia hipotensión arterial, hipertensión arterial, shock, eclampsia, neuropatías, idiosincracias a los analgésicos locales, infecciones locales en el lugar de la puncion, deformaciones del raquis, reacciones luéticas positivas en el líquido céfalo raquídeo dosificación de hemoglobina menor del 60 per centum, cuenta de eritrocitos de menos de 3 000,000, etc , pues ello puede ser fatal a la parturiente y tambien de graves consecuencias para el producto

Es necesario a veces, sobre todo cuando el método se lleva a cabo en un medio sanatorial u hospitalario, tener a la mano un aparato para que el anestesiólogo ministre inhalaciones de oxígeno en circuito cerrado, cuando las contingencias del trabajo de parto o del nacimiento del niño así lo requieran No obstante, como más adelante lo comentamos, el procedimiento puede ser llevado a efecto en condiciones tales que no permitan la obtención de ese recurso

CASUISTICA

Las enfermas a las cuales hemos aplicado el método de raquianalgesia obstetrica selectiva de Parmley Adriani, sumas hasta ahora, un total de 30 casos que clasificamos en la siguiente forma

Primigestas	7
Multigestas	23
Con premedicación (Demerol)	5
Sin premedicación	25
En período de dilatacion	23
En período expulsivo	7
Presentaron vómito o estado nauseoso acentuado	
No presentaron vómitos ni nauseas	26
Con una sola puncion raquídea	28
Con dos punciones	2
Parto espontaneos	26
Partos quirurgicos	4
Con parto de feto vivo	30
Con parto de feto vivo que lloró inmediatamente despues de nacer	29
Con feto vivo que nació apneico	1
Duración del parto hasta de 3 hs	26
Duración del parto hasta de 4 hs	4
Duración del parto de más de 4 hs	3
Con desgarro perineal	1
Con desgarro cervical	1
Sin desgarro	28
Con alumbramiento normal	30
Con alumbramiento natural	0
Con hemorragia durante el alumbramiento	2
Sin hemorragia durante el alumbramiento	28
Con trabajo de parto con evidente distonía por hipotonía uterina	5
Con trabajo de parto sin alteracion del ritmo contractil uterino	25
Con hipotensión arterial durante la raquianalgesia	4
Con hipotensión arterial después de la raquianalgesia	4
Sin modificación ostensible de las cifras tensionales	26
Con puerperio normal desde el punto de vista obstétrico	30
Presentaron cefalea intensa durante el puerperio	10
Presentaron cefalea liguera durante el puerperio	7
No presentaron cefalea durante el puerperio	13

COMENTARIOS

Del estudio analítico del procedimiento descrito a la vez que de la observación cuidadosa de cada una de las pacientes a las cuales se aplicó, podemos poner de manifiesto algunos hechos que aparecen como características de él

Desde luego sorprende la extraordinaria sencillez de la técnica, puesto que no requiere ni instrumental especial ni presupone tampoco la necesidad urgente de ser llevado a cabo en un medio sanatorial u hospitalario, de lo que se infiere que esta efectivamente al alcance del médico general

Por lo que se vé, en realidad no existe diferencia fundamental entre la raquicentesis que se practica usualmente con fines quirúrgicos y ella, las diferencias estriban solamente en la posición de la paciente durante y después de la punción, por un lado, y por otro en que el analgésico usado pertenece al grupo de los de larga acción y a una dosis insignificante.

Además sorprende la inocuidad del método, puesto que no dió lugar a ninguna complicación ni por parte de la madre ni del producto, ya que una y otro se condujeron en una forma del todo semejante a lo que ocurre en partos normales o distócicos en los que no se practica ningún tipo de analgesia obstétrica.

Es importante hacer resaltar que en términos generales, no produce ninguna alteración en el ritmo contráctil del útero, cosa que en cambio es de frecuente observación en las demás técnicas de analgesia o anestesia obstétrica, y que nos estamos refiriendo a las distonías uterinas por hipotonía o atonía.

Es cierto que, en nuestros casos, se presentaron algunos de distonía por hipotonía uterina, pero su frecuencia sólo alcanza al 16.5 per centum a la vez que fueron discretas puesto que en la mitad sólo se requirió el uso de 5 unidades de Extracto Pituitario (Pitocín) y en la otra mitad, de 10 unidades de dicha substancia por la vía hipodérmica, con lo cual fué suficiente para que terminara el trabajo de parto por la expulsión espontánea y absolutamente normal del producto.

Solamente en dos casos de los 30 estudiados hubo inercia secundaria post-alumbramiento que cedió al empleo de un centímetro cúbico de ergotrate por la vía endovenosa.

Las modificaciones de la tensión arterial a que dió lugar también fueron muy discretas y la vista del resumen de nuestra casuística basta para poner de manifiesto su escasa importancia.

Deseamos resaltar que durante el puerperio, habitualmente dentro de las primeras veinticuatro horas posteriores al parto, un 55 per centum de las parturientas estudiadas se quejaron de cefalea gravativa, de intensidad mediana casi siempre acompañada de dolor de los globos oculares y a veces de ligero estado nauseoso que se intensificaba con los cambios posturales y que cedió paulatinamente a la inyección endovenosa de 20 cc. de suero glucosado hipertónico al 20 per centum y a la prescripción de medicación antiálgica. En casi todas ellas esta cefalea desapareció entre el 4o. y el 5o. día del puerperio.

Fuera de esta complicación, evolucionó dentro de límites extrictamente fisiológicos en todo comparables a los de mujeres con parto normal y a las que no se aplica ningún tipo de anestesia obstétrica.

Intencionalmente hemos dejado para la parte final de este comentario, las consideraciones relativas a la supresión del dolor.

Debemos afirmar categóricamente que en todas las pacientes se suprimió totalmente la sensación dolorosa de la contracción uterina, lo que ocurrió por término medio a los 5 minutos después de hecha la punción y que excepto en dos casos, bastó una sola inyección para proporcionar a las parturientas una supresión completa del sufrimiento físico.

Es de todo punto importante explicar a la enferma que, suprimidos los dolores habrá de sentir una sensación de contracción y endurecimiento del vientre que se inicia con el principio de cada contracción, y que puede ser corroborada por el partero y le permite medir la duración e intervalo de las mismas. Por otra parte explicamos a la paciente acerca de la manera más efectiva de colaborar a la aceleración del período expulsivo, por la contracción voluntaria de los músculos abdominales.

Fué notable también el extraordinario relajamiento de la pelvis blanda: cervix, vagina, vulva, periné, lo cual facilitó hacer maniobras de dilatación para completar ésta en los casos en que se estimó pertinentes; y es por esa notable relajación muscular por lo que nos explicamos, el que únicamente en dos enfermas primigrávidas hubiesen tenido, una de ellas ligero desgarro de la horquilla y la otra un pequeño desgarro cervical.

Dos de nuestras pacientes requirieron gran extracción podálica, una de ellas primigesta, obesa, en la que pudo efectuarse la maniobra rápida y satisfactoriamente lo mismo que en la segunda, multigesta, en que se hizo la extracción sin dificultad y sin desgarro de las estructuras. En un tercer caso fué precisa la aplicación de forceps en el estrecho medio, por inercia secundaria, sin incidentes y en los tres la analgesia fué absoluta y las mujeres no sufrieron durante las maniobras del obstetra Ello nos hace anticipar, aunque provisionalmente, que el procedimiento puede ser de gran utilidad en aquellos casos en que se requieran procedimientos tocoquirúrgicos

Estando ya terminada esta comunicación que hoy presentamos apareció publicado en el número de octubre de este año en el *American Journal of Obstetrics and Gynecology*[3] un artículo de los Dres Parmley y Adriani sobre la raquianalgesia obstétrica de "bloqueo en silla" como ellos le llaman, y en el cual llegan del todo a conclusiones semejantes a los que nosotros hemos expuesto en esta presentación, con la diferencia de que nosotros mantenemos la posición de Fowler durante todo el tiempo del trabajo de parto, que usamos la premedicación cuando ella esta indicada y que por excepción el parto es terminado quirúrgicamente

CONCLUSIONES

De todo lo anteriormente expuesto podemos concluir que

1 La raquianalgesia obstétrica selectiva, que tal es la denominación que proponemos para la técnica de los Dres Parmley y Adriani, es efectiva y suprime totalmente los dolores del parto

2 La analgesia obtenida corresponde al 100 per centum de los casos, en el estudio que presentamos

3 La raquianalgesia que nos ocupa no provoca en la mayoría de las parturientas ninguna alteración en la marcha normal del trabajo de parto

4 La técnica que hemos practicado, no provoca ninguna modificación en la marcha del alumbramiento

5 No da lugar a ningún fenómeno asfíctico del recién nacido

6 No produce hipotensión arterial digna de ser tomada en consideración

7 No origina ninguna modificacion del puerperio

8 El método ocasiona con frecuencia *durante el puerperio, una cefalea gravativa de* mediana intensidad

9 La raquianalgesia obstétrica selectiva debe ser considerada en el estado actual de nuestros conocimientos como el procedimiento de analgesia obstétrica ideal, por su técnica fácil y su completa inocuidad

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News Notes

The Sixth Annual Meeting of the **American Otorhinologic Society** for the Advancement of Plastic and Reconstructive Surgery was held in Chicago, October 9, 1948, with headquarters at the Palmer House. Recent action by the Society provides for associate and corresponding membership in addition to full fellowship. Complete details are available through the Secretary, Dr. Norman N. Smith, 291 Whitney Avenue, New Haven 11, Connecticut.

Laboratories of the **Samuel S. Fels Research Institute**, Temple University Medical School, were dedicated October 23, 1948. The principal address was delivered by Dr. Edwin G. Conklin, followed by an address by Samuel S. Fels, President of the Samuel S. Fels Fund and founder of the Fels Research Institute, in which the purposes of the Institute were set forth. Addresses of dedication were delivered by Dr. Robert L. Johnson, President of Temple University; Mr. Louis Magaziner, architect of the new laboratory, and Dr. Harry Shay of Temple University Medical School. The day before the dedication was devoted to inspection of the laboratories followed by a symposium on recent advances in gastric physiology in which the following took part: Dr. Boris P. Babkin of McGill University; Dr. J. Earl Thomas of Jefferson Medical College, Philadelphia; Dr. Frank Charles Mann of the Mayo Foundation, and Dr. Harold L. Stewart of the National Institute of Health, U. S. Public Health Service.

Lieutenant Colonel Paul S. Roland, now of Florida, formerly in service in China and other far Eastern theaters of war, was decorated by the National Government of the Republic of China with the "Special Breast Order of Cloud and Banner with Certificate" in recognition of meritorious services. Dr. Roland's services were given at risk of his life to men on the famous death march on Bataan and later while a Japanese prisoner of war.

The National Academy of Medicine, **Colombia**, has elected the following officers:

President: Dr. Manuel Antonio Cuallar Duran.
Vice-President: Dr. Pedro Jose Almanzar.
Secretary: Dr. Andres Soriano Lleras.
Treasurer: Dr. Gonzalo Reyes Garcia.

The Eighth National Assembly of Surgeons took place in the Hospital Juarez of **Mexico** from November 14 to 20, 1948. It was attended by numerous members of the International College of Surgeons.

Prof. Dr. Ramon Osorio Carvajal, F.I.C.S., was recently elected President of the **Yucatan** Society of Gynecology and Obstetrics.

The **Italian** Center for Medical and Surgical Researches, which is affiliated with the Mario Donati Foundation, Milan, Italy, is devoted to furnishing a world-wide bibliographic service to the medical profession. American medical men are invited to send reprints and other publications to the Mario Donati Foundation, via S. Andrea 6, Milano, Italy, and thereby become indexed in its international file which already comprises five million references. An extension of the work will be the publication of reviews and abstracts in Italian periodicals. The secretary of the U. S. Committee is Prof. Gemma Barzilai, 115 East 92 St., New York 28, N. Y., to whom requests for further information may be addressed.

Three International Surgical Days in Turin

The centenary of Italian independence was celebrated on May 27, 28 and 29, 1948, as three "International Surgical Days" in Turin. This celebration was under the Chairmanship of Prof. A. Mario Dogliotti and commemorated the masters of the modern Piemontese Surgical School, Professors A. Carle, M. Donati, and O. Uffreduzzi. This international congress was attended by many eminent surgeons from all over the world, including a large number from America. The International Surgical Society was represented by Doctors Dejardin and Mayer, and the International College of Surgeons by Doctors Herbert Acuff, Max Thorek and Francisco Graña.

At the inaugural session, May 27, the speakers being Dr. Coffiola, Mayor of Turin, M. Allara, Rector of the University of Turin, Dr. Bertocchi, President of the Piemontese Surgical Society, Dr. Max Thorek, and Dr. Dejardin. The commemorative addresses were made by Dr. Fasiani, who spoke of Prof. Carle; Professor Paolucci, who described the brilliant career of Prof. Donati; and

Professor Dogliotti who evoked the unforgettable personality of Prof Uffreduzzi, the initiator of bronchonarcosis by the endotracheal route

The meetings were organized under the leadership of Profs Dogliotti Graña, Fontaine, Monod Thorek, and Chauvin Some of the official representatives of the universities were Prof R Fontaine (Strasbourg), Prof P Wertheimer (Lyons) Prof A Morice (Caen), Prof P Chalnot (Nancy), Prof de Girardier (Dijon), Prof F Fonseca (Mexico City) Prof A Laffont (Algiers) Prof F Carcassone (Marseilles), Prof A Fonio (Berne) Prof I Aird (London), Prof Benniot (Grenoble), Prof dos Santos (Lisbon), Prof Monteiro Bastos (Portugal), Prof I Rivas (La Plata), Prof A Baraldi (Rosario, Argentina), *Prof F Albert (Liege)*

One of the interesting side trips was made by cable car to the chalet of M Lora Totino, at the foot of the Matterhorn, at a height of 3,600 meters in the glaciers of the Alps

At a meeting presided over by Prof Mario Dogliotti, the Italian Society of Anesthesia and Analgesia the activities of which had been interrupted by World War II, officially resumed its functions Prof M Monod of Paris, and Prof M Ceccarelli (Padua), supported this resumption of the Society's activity Prof Monod recalled the fate of the French Society of Anesthesia and Analgesia which had been similar to that of the Italian Society Prof Ceccarelli discussed the difficulties that attend the training of the anesthetist, and his indispensability in all modern surgical organizations

Prof Klein (Paris) proposed the foundation of an International Society of Neurosurgery This suggestion aroused the most lively interest among the neurologists and neurosurgeons present Among the speakers were Prof Fasiani (Milan), Prof Dogliotti (Turin), Prof Ceccarelli (Padua), Prof Forni (Bologna), and others

The congress was very satisfactory, since for the first time there was a daily newspaper, edited by Minerva Medica which in its entirety was dedicated to the congress reporting the proceedings and abstracting the papers, discussions and conferences day by day

Among the operations performed at the operative clinics were the following Prof de Paola (Rome) performed an apical axillary thoracoplasty, Prof Dogliotti performed two subdiaphragmatic vagotomies *for gastroduodenal ulcers, one pneumonectomy* for pulmonary cancer, one lobectomy for multiple pulmonary abscess, Prof Camera (Turin) performed a shortening of an inferior extremity for inequality of the two extremities a reconstruction of the cotyloid cavity for dislocation of the hip, and an operation for clubfoot

Some of the papers presented at the congress are reported below

Soler Roig (Barcelona) read a paper on **Transthoracic Surgery of the Digestive Apparatus** The author reported his experience in surgery of the thoracic esophagus, for which he prefers an approach from the right He also spoke of 15 cases in which he performed vagotomy of the therapy of cardiospasm and of his results in total gastrectomy

Morelli and Di Paola (Rome) presented a paper titled **Apicoaxillary Thoracoplasty** After reviewing the physiologic and pathologic factors in the technic of thoracoplasty for pulmonary tuberculosis, the authors demonstrated their apicoaxillary thoracoplasty, which consists of the total removal *by the axillary route, of the first four or five ribs* which are disarticulated from the vertebral body this is followed by apicolysis The technic which requires special instrumentation, permits the attack upon the ribs with a small incision, passing between the lattissimus dorsi and the pectoralis major All thoracic deformity is thus avoided, and the short incision is completely concealed when the arm of the patient is in normal position Thoracoplasty, according to Morelli, is a real step forward in the therapy of pulmonary tuberculosis It may be employed for apical, subapical, unilateral and bilateral lesions The clinical results were good, the operative traumatism slight, the static integrity and esthetic aspect of the thorax are maintained

Acuff (Knoxville, Tenn) read a paper on **Clinicopathologic Evaluation of Tumors of the Mammary Glands** The author stated that carcinoma of the breast usually presents a solitary nodule in one of five zones

In the superior external area	11 0 % of cases
In the superior internal area	14 5 % of cases
In the inferior external area	15 2 % of cases
In the inferior internal area	0 7 % of cases
In the areola or central area	22 0 % of cases

The speaker noted that, according to his own experience, 90 per cent of tumors of the mammary glands are malignant, that these malignant tumors represent 15 per cent of all malignant tumors of the body, and 30 per cent of cancers in women

The frequency of distant metastases is as follows

Pleuropectoral and intercostal	51 0%
Pulmonary	50 0%
Hepatic	48 0%
Bony	25 0%
To the mammary gland of the opposite side	7 5%
To the skin	25 0%

Dr. Acuff stressed the importance of early diagnosis and the technic of clinical examination in which he employs transillumination. In treatment he discussed simple mastectomy; radical mastectomy; and roentgenotherapy.

After describing the characteristics of cancers which he considers inoperable, he gave the details of his operative technic and roentgenotherapy.

Fonseca (Mexico City) spoke on **Clinical Considerations of Sarcoma of the Mammary Glands.**

Mandl (Vienna), discussing **The Treatment of Rectosigmoidal Carcinoma**, said that many changes in rectosigmoidal surgery have occurred since 1940. The indications must be individual, and in selecting the operation the surgeon must take into consideration the patient and not the disease. He must consider:

1. Nonmodifiable constitutional and anatomic factors of the patient (the relation of the vessels of the sigmoid and the extension to the mesosigmoid, which present very important individual variations for the mobilization of the cancer).
2. Other nonmodifiable factors presented by the localization and other characteristics of the tumor: that is, local and general complications, such as metastases.
3. Complications capable of modification, which consist of inflammation and conditions of intestinal involvement, which can be treated very efficiently by bactericides.
4. Preoperative preparation of the patient.
5. Selection of the operation.
6. Postoperative treatment.

The author did not agree with those who contend that amputation and extirpation give better results than resection. He preferred the preservation of sphincter. In speaking of methods which save sphincter the author cited the modification proposed by Bacon and Babcock of the Hochenberg method as giving surprisingly favorable results. The intervention may be practiced without colostomy and exclusively by the sacral route. The author recalled the secondary methods which assure the continence of the anal sphincter.

Bacon (Philadelphia), discussing **The Surgical Treatment of Chronic Ulcerative Colitis**, stated that the treatment of this condition is essentially medical. It consists of an individualized diet, adequate vitamins, small and frequent blood and plasma transfusions, and parenteral administration of protein and sulfathalidine alternated with neoprontosil. The author does not hesitate to employ antiamebics, even though the stools may be negative for the parasite. Surgical intervention is indicated in cases which have had two or three serious recurrences and remissions of the disease. Usually the preliminary ileostomy can be followed by colectomy. The operation can be performed in one or several stages. Following a preliminary ileostomy operation may be done on the ascending, transverse, and descending colon. After that, owing to the frequency (more than 90 per cent) with which the rectum is involved, the author believes that in almost all cases the rectum must be extirpated by the abdominoperineal route.

Though generally a total colectomy is indicated, in several cases a partial colectomy or a segmental resection may prove satisfactory. The mortality of emergency ileostomies in the author's experience is about 22.2 per cent; according to Cave, the mortality of emergency ileostomies is 53 per cent; in elective ileostomy the mortality falls to 6 to 9 per cent. Bacon's results with total or partial colectomies (10 cases) were particularly favorable—not one death. The complications of ileostomy are enumerated and reference is made to the favorable results from vagotomy reported by Dennis.

Monod (Paris) spoke on **Intrathoracic Neurinoma.**

Gorelik (New York) presented a film on **Cardiopexy (Thompson's operation).** Indicated in the treatment of coronary disease, the operation is to create a supplemental vascular inflow to the ischemic myocardium by creating pericardial adhesions through the agency of talcum powder. After careful clinical and postclinical selection of patients, the pericardial region is entered following resection of the fifth left costal cartilage. The pericardium is opened, bathed for a few minutes in novocaine, then powdered with 8 Gm. of talcum powder and closed. The Thompson operation, as reported by different surgeons, has been performed in 64 cases, with 4 deaths.

Pieri (Udine), discussing **Vagotomy in the Treatment of Gastric Affections**, stated that since 1927 he has performed bilateral resection of the pneumogastric nerve in 127 cases of ulcers, 8 gastric neuroses (of which 3 were hypersthenic dyspepsias), 2 mediogastric spasm, 2 uncontrollable vomiting, one tabetic crisis, with very favorable results in all cases except the tabetic crisis, in which only one showed improvement.

Of the ulcers, 49 were cases of gastroduodenal anastomoses; 8 had followed resection; in 29 the gastric ulcers were too high for resection; in 40 cases vagotomy was done as a prophylactic measure in duodenal ulcers in which the gastric acidity was very high.

Supradiaphragmatic vagotomy was done in 8, and in the remainder subdiaphragmatic vagotomy.

Albert (Liége) reviewed the **Surgical Treatment of Essential Hypertension.** The author was impressed by the variable, and at times even paradoxical results He has come to the conclusion that the problem of essential hypertension is still obscure, and emphasized the etiologic uncertainty both from the clinical and experimental standpoint This provoked a fruitful discussion in formulating a few suggestions for future research

Bailey (London) presented a film on **The Surgical Treatment of Parotid Tumors.** In the discussion that followed, Chalnot (Nancy) reported the experiences and results of the French school (Pierre Duval) which dissects the facial nerve and cuts the mastoid process It is important to save the most important filaments of the facial nerve, especially the superior ones, and the paralysis of the face is in all cases transitory. Pettinari (Milan) reported the important results of stellectomy according to Leriche for voluntary and involuntary facial lesions which are not uncommon in operations for malignant tumors of the parotid. He reported that with stellectomy he had obtained complete or sufficient closure of the palpebral rim in 4 cases

Gonzales Garcia (Cuba) showed a film on **Osseous External Synthesis According to Haynes** His experience leads him to affirm that external fixation of the affected lung with Haynes' apparatus is the best technic It permits early ambulation, prevents muscular atrophy and articular rigidity.

Lascaris showed a film on **Intocostrin in Anesthesia.**

Iselin (Paris) read a paper on **Surgical Treatment of Dupuytren's Contracture.** The author, who has had extensive experience with this disorder since 1940, classifies his 77 cases in four degrees: The **first stage** is characterized by a simple cutaneous nodule without flexion of the fingers, in these cases it is useless to operate The **second stage** is characterized by flexion of the fingers not exceeding a right angle, the **third stage** by flexion to a right angle of the fifth, fourth and second fingers, and the **fourth stage** by ankylosis of the second articulation of the flexed fingers These cases contraindicate conservative surgery. It may even be necessary to amputate if the deformity handicaps the patient a great deal

In the second and third stages the incisions must permit the thorough dissection of all the affected parts of the aponeurosis and the excision of the zones where the skin is invaded by nodosities Longitudinal incisions should be avoided for they are followed by secondary contractions All loss of substance can be covered by cutaneous grafts Immobility should be restricted to a minimum and limited to the affected fingers The results are said to be excellent.

Fontaine (Strasbourg) contributed a paper on the **Biochemical Study of Venous Thrombosis as Related to Medical and Surgical Treatment** The author's biochemical studies were made with dicoumarin and heparin He is convinced that not all venous thromboses are due to an increase of prothrombin In a few cases the Lenggenhager reaction as to the quantity of prothrombin has suggested an excess of thromboplastin He believes that the mechanism of hypercoagulability in venous thrombosis is not always the same Thus all thromboses are not amenable to dicoumarin and heparin therapy

In studying arterial obliteration the author found that in acute thromboses the thromboplastin may be increased without any variation in the prothrombin He found this same phenomenon in the post operative periods immediately after the majority of operations On the other hand, in operations upon the sympathetic and in arterial thrombectomies, the Lenggenhager reaction time (reaction to the degeneration of thrombin) is lengthened without appreciable modification of the prothrombin rate

Postoperative hypercoagulability must be due essentially to an excess of thromboplastin

Consequently, Fontaine believes that patients menaced by phlebitis or who are suffering from a beginning thrombosis must be followed very closely from the biochemical standpoint. True coagulograms are necessary taking into consideration all the factors involved in blood coagulation Dicoumarin and heparin are useful drugs but are not of universal value In many cases these two drugs prove disappointing It is then necessary to perform thrombectomy or phlebectomy, where simple venous ligatures are only exceptionally indicated

Klemme (St Louis) showed a film on **The Surgical Treatment of Trifacial Neuralgia.** He reported that in 98 per cent of cases it is necessary to cut the trifacial nerve and to preserve the ophthalmic branch and the motor fibers because in only 22 per cent of these cases is the ophthalmic branch involved The saving of the ophthalmic branch avoids eye complications

The operative risks in treatment of trifacial neuralgia of the glossopharyngeal nerve is less than 0 5 per cent

Costantini (Algiers) in **Surgery of the Mediterranean Splenomegalies** considers splenectomy unjustified in cases of malaria and splenomegaly and those due to kala azar, though he considers the Mediterranean splenomegaly occurring in Egyptians and in those whom he and Goinard call Algerians a surgical affection

Grégoire, Sergent and Suire considered dangerous the removal of very large spleens and those which are adherent to the abdominal wall and viscera

Ligation of the splenic artery, according to Lemaire, represents a less dangerous measure, allowing progressive atrophy of the spleen and thus evading splenectomy.

Today, with improvement in transfusions, anesthesia, and surgical technic, splenectomy is a relatively safe operation.

The author sums up the operative difficulties of splenectomy, the complications and the means of avoiding them. 1. In the presence of anemia prepare the patient with transfusions of fresh blood. 2. To limit blood loss at operation, avoid the defective clamping of the vascular pedicle. During the operation give abundant perfusions (about 2 liters); practice perfect hemostasis; infiltration of the pedicle; isolation of the vessels which are ligated separately; application of coagulants with a basis of thrombin which are liberated when in contact with the bleeding surfaces. 3. Limit postoperative blood loss by suturing the greater curvature of the stomach to the parietal peritoneum so as to isolate the splenic area, which can be tamponned with a Mikulicz drain, and protect the stomach by a rubber sheet. 4. Limit pulmonary complications by selection of proper anesthetic and pre- and postoperative use of penicillin. 5. Late hemorrhage can be treated by prolonged transfusion. 6. The operative difficulties due to perisplenic adhesions, which are not a contraindication to intervention if one can find a line of cleavage, as Lombard demonstrated, between the pulp and the adherent capsule. 7. Excessive volume of the spleen by pre-, intra,- and postoperative transfusions. 8. Insufficiency of the incision to give access, in which event the incision must be made along the cartilaginous margin and the chondral pedicle divided on a vertical incision along the external borders of the rectus abdominus.

When ascites is present, splenectomy is indicated and may arrest the disease.

Klein (Paris), in a paper titled **Operative Indications in Closed Traumatisms of the Spinal Cord**, stated that the lesions of the spinal cord guide the choice of therapeutic measures. After considering the pathologic physiology of osseous and medullary lesions, and pointing to the existence of such phenomena as elongation and compression of the spinal cord, and a series of other lesions (vascular, hemorrhagic), the speaker called attention to the importance of a little known lesion—edema of the cord with slight hemorrhage.

Six evolutionary stages were distinguished:

1. Stage without paralysis.
2. Stage with paralysis but relative conservation of voluntary motility.
3. Stage of total paraplegia with tenderness and hyperactive reflexes.
4. Total paraplegia with marked diminution of reflexes.
5. Flaccid paraplegia without reflexes.
6. Flaccid paraplegia with decubitus.

The reflexes follow these evolutionary stages and do not at all indicate an automatic condition of the spinal cord.

The operative indications are dictated by the evolution of the medullary lesion. The only lesion which cannot be improved is that of total division of the cord. Outside of that, one must often have recourse to emergency treatment, which consists first of orthopedic repair of the osseous damage by bloodless reduction, except when the articular apophyses are involved. If, despite reduction of vertebral disparity, the condition of the cord grows worse, exploration of the cord should be done and the lesions (hematomyelia, edema, cicatrices, vascular lesions) attended to as indications dictate. All such intervention is indicated for late disturbances.

Fasiani (Milan) presented a paper on **Surgical Treatment of Hydrocephalus**, which was followed by active discussion.

Wertheimer (Lyons), in presenting **Comments on Raynaud's Disease: 35 Cases Treated Surgically**, reported his personal experience with a group of cases of Raynaud's disease of which 20 were females and 15 males. Of the 35 cases, 26 presented only associated vasometric crises without ulceration; 6 were of the moderate type. In 19 cases the disease involved the inferior extremities at the same time. Surgical procedures were as follows: periarterial sympathectomy (15 cases); stellectomy (35 cases); substellar section of the thoracic chain (4 cases); thoracic sympathectomy (3 cases); lumbar (4 cases); splanchnicectomy (1 case); parathyroidectomy (3 cases); thymectomy (2 cases); suprarenalectomy (1 case). The results after periarterial sympathectomy are mediocre. Sympathetic ablation was of little value. Glandular intervention failed. Results indicate the unsatisfactory outcome of surgical intervention.

Akif Chakir Chakar (Istanbul) discussed **The Role of Osseous Grafts in Osteoarticular Surgery.** Removed from its natural bed, the graft first seems condemned to total or subtotal death. Then it undergoes diverse transformations of rehabilitation, resorption and reconstruction. According to the researches of Robison, an important part in the phenomena of ossification is played by the cellular ferment of the bone. This ferment makes its appearance in the embryo with the first points of ossification and, according to the author, a parallel can be observed between the real ossification and recalcification of the osseous graft of impaired vitality; in time one may hope to obtain that ferment by means of synthesis or other means

He utilizes the graft in tuberculosis of the olecranon, in bacillary trochanteritis, in the sequalae of infantile paralysis, in tuberculosis of the vertebral column and in coxalgia

The graft plays the part of conductor and guide to osteogenesis

Hall (Washington, D C), in a paper on "The Treatment of Pseudoarthroses of the Femoral Neck," discussed the causes of pseudorathroses of the femoral neck and their treatment with osseous grafts, the Smith Petersen nail, osteotomies and reconstructive surgery, with the results of the various treatments

Scherb (Zurich), in a paper on **Research upon Myokinesis in Relation to Tendon Transplantation** stated that his experience with tendon transplantation often gives very good results in postpoliomyelitic paralysis Where failures occur the causes must be sought Having studied graphic representations of muscular activities of the lower extremities during ambulation in relation to the beginning and the end of muscular action and with the variations of shape occurring in contraction, the author came to the following conclusions

1 In the upper extremities the transplant may adapt itself to its new function without restriction
2 The same may apply to the lower extremities only if the new function of the graft is synergic with its primary function, that is, if the action of the muscle to be transplanted is synchronous with that of the muscle whose place it is to take
3 If the new function is antagonistic from the standpoint of synchronism to the primary function, the transplant cannot adapt itself to its new function unless there is a total paralysis of all the muscles asynergic to the transplanted muscle

J J Herbert (Aix les Bains) presented a paper titled **Vertebral Osteotomies in Severe Ankylosis of the Spinal Column** He found this problem to be especially important in ankylosing spondyloarthritis After demonstrating the mechanisms of the deformities in the spondyloses which produce a large lumbodorsocervical kyphosis the author described his technic of osteotomy This operation is applicable in severe cartilaginous kyphosis, because when there is no bony union it is always possible to overcome the deformities by simple maneuvers

He performs the osteotomy in two stages (1) posterior stage—cutting the posterior arch, and (2) anterior stage—dividing the anterior arch at the level of the ossified disks The posterior stage consists of effecting the cuneiform osteotomy by carefully collapsing the posterior wall of the vertebral foramina This is the essential step The anterior stage, which is more difficult, effects an osteotomy at the level of the disks corresponding to the posterior osteotomy These two stages are performed with a ten day interval between them Seven patients have been thus operated, six in the high lumbar region and one at the lower region The technic is totally different in the two types

Perfect results were obtained Three weeks after the operation the patient is allowed up in a plaster cast Consolidation is obtained in three or four months

Hryntschak (Vienna) presented a paper on **Retropubic Prostatectomy Compared with Transvesical Prostatectomy with Immediate Closure of the Urinary Bladder** The author stated that under the heading of suprapubic transvesical prostatectomy we can group many different methods which have nothing in common except access to the prostate through the bladder One of the methods of choice is that of the Australian, Harris, which permits the immediate suture of the bladder without hypogastric drainage, a method which has since been improved and simplified by the author himself The prime advantage of the Harris Hryntschak method is the rapid cure of the patient, which permits him to urinate freely without a catheter in 7 to 9 days

Millin's retropubic prostatectomy is an improvement over the old Freyer Fuller methods and of perineal prostatectomy, it also has advantages over the method of Harris Hryntschak, which the author discusses briefly

Perrier (Lausanne) described **Retropubic Prostatectomy—Millin's Operation** in detail It is less shocking, has more numerous indications and the postoperative sequelae are less severe than those following the Freyer operation Impotence or rectal or perineal fistulae are less apt to follow the Millin operation than the perineal procedure

Chauvin (Marseilles) discussed **The Therapeutic and Diagnostic Value of Infiltration Anesthesia of the Renal Pedicle Without Anuria** The author stated that infiltration anesthesia of the renal pedicle paralyses the musculature of the kidney pelvis and of the entire ureter, activates renal circulation through vasodilatation, and often subdues pain of renal origin

From the therapeutic standpoint, the infiltration of the renal pedicle in ureteral lithiasis permits the evacuation of calculi (26 cases) and may have a curative effect on renal colic It has a favorable action, though less positive, upon pyelonephritis, acute nephritis, and chronic nephritis

Infiltration of the renal pedicle will assist in tracing lumbar pain of parietal (if the sists after anesthesia of the pedicle), renal or visceral origin. It can also serve to establish the existence of crossed pains, because the anesthesia does not go beyond the medial line. It can act upon only one kidney, and if we succeed in effecting subsidence of pain of one kidney by anesthetizing the kidney on the opposite side, that is proof that the kidney of the painful side is not responsible.

Maurizio (Catania) presented a paper on **Surgical and Radiation Therapy for Cancer of the Uterus.** The author stated that cure in cancer of the uterus undoubtedly rests upon early diagnosis and upon surgical and radiation therapy. Of 1,052 cases treated, 929 involved the cervix and 123 involved the body of the uterus. Eleven were pregnant. The author has operated upon 156 cases, 102 for malignancy of the cervix, 54 for that of the corpus. In all, the operations were by the abdominal route. In 101 cases the Wertheim operation was performed; in 50, total hysterectomy; in 5, subtotal hysterectomy. The postoperative mortality is 3 per cent for the Wertheim operation, and 2 per cent for total hysterectomy. Preoperative cystoscopy may disclose early infiltration, especially in cancer of the cervical neck. In young patients less than 30 years of age the tumor is especially malignant. Recurrences are frequent in the first year after intervention.

In first degree cancer of the neck of the uterus curietherapy (10 med. ten days before and ten days after the operation) was employed in 10 per cent of the cases. In 100 cases roentgenotherapy followed 30 or 40 days after the operation. Cure was obtained in 80 per cent of the cases.

In cancer of the body of the uterus, all operable cases of the first and second degree are subjected to total hysterectomy by the abdominal route. In only 5 cases was subtotal hysterectomy performed, supplemented by cervicovaginal roentgenotherapy. The total results are cure in about 75 per cent of the cases.

Radium suffices for the primary malignant manifestations, but in cases of third and fourth degree the radium cannot act upon the infiltrations of the parametrium and on simple adenopathies. The author seeks to avoid, or reduce to a minimum, all traumatisms. He makes endocavital applications and continues to increase the doses, augmenting them to 10 to 12,000 mgrh.

Roentgenotherapy has improved the percentage of cures in third and fourth degree cases and in those previously operated upon.

Gil Vernet (Barcelona) presented a paper on **Genital Tuberculosis.**

[illegible] (Boston), discussing **Cardiovascular Surgery in 1948** [illegible] that the first operation he [illegible] of the pericardium for chronic constrictive pericarditis (Churchill). This operation was practiced in hundreds of cases in the United States with success in 50 per cent.

The author discussed procedures for congenital anomalies, and advised surgery on all patients under 30 years of age. Contraindications to the operation of Blalock for "blue babies" were discussed.

The congenital anomaly of a vascular ring compressing the esophagus and trachea can be cured by cutting the ring.

In surgery of the war, important progress was made in removing foreign bodies from the pericardium and from the heart itself. In arteriovenous fistulae and in aneurysms, the value of surgery is in its infancy. Mitral valvulotomy of Cutler is uncertain in results because in correcting the stenosis there is danger of increasing the valvular insufficiency.

In a very interesting case of mitral stenosis, Sweet, of Boston, effected successful anastomosis of the pulmonary vein with the azygos vein.

In any case of thrombosis of the lower extremity, anticoagulant therapy may be successful. Often the method of choice is the ligature of the two femoral veins.

Arterial embolectomy has saved many lives, but must be practiced during the first hours.

The author also discussed the operations currently employed in surgery of the sympathetic nervous system.

The following papers announced in the program were not presented:

Bailey (London): "Some Clinical Entities" and "What Anatomy and Surgery Owe to Italy."

Baraldi (Rosario): "Personal Technic for Uterine Retroflexion."

Christmann (La Plata): "The Conception of the Etiology of Gastroduodenal Ulcers."

Dos Santos (Lisbon): "The Status of Phlebography."

Giralt (Cuba): "Surgical Treatment of Pulmonary Cancer."

Howes (New York): "Management of Surgical Diseases of the Pancreas."

Leveuf (Paris): "Reconstruction of the Hip Joint Destroyed by Osteoarthritis of Nurslings."

Manzanilla (Mexico): "Topography of the Parathyroid Gland."

McNealy (Chicago): "Present Day Large Bowel Surgery."

Nissen (New York): "Recent Advances of Surgery of the Thoracic Esophagus."

Olivecrona (Stockholm): "Surgical Experiences with Acoustic Tumors."

Thorek (Chicago): "Italy's Contribution to Surgery."

New Books

Anatomy of the Human Body By Henry Gray, Edited by Charles Mayo Goss, Ed 25, Philadelphia, Lea & Febiger, 1948 Here is a book which should be handled with reverence It has been the anatomic Bible for generations of medical students, and a reference guide to countless surgeons in active practice To this reviewer it brings a feeling of nostalgia but also bright memories of student days of nearly 50 years ago Many of those whose faces were buried deep in the pages of Gray have finished the course and are no longer with us in the flesh, but their zeal and passion to "make good in medicine" glow still in the fire of the spirit, long remembered and honored

For purposes of comparison, the old Gray bearing the imprint of "Lea Brothers & Co , Philadelphia and New York, 1901" was brought down from the shelf It contains the names of the British scholars, Pick and Howden, the former a surgeon to St George's and to the Victoria Hospital for Children the latter, Professor of anatomy in the University of Durham This was a revised American edition from the fifteenth English edition and contained 1257 pages but no plates in color The present twenty-fifth edition has 1478 pages, 1263 illustrations "mostly in color" against the old 780 black and white, with red and blue color appearing only in pictures of blood vessels, and to outline certain structures Embryology constitutes the first chapter in the new issue, it was the *last* in the older book, *but it was there, which is of importance "Surgical anatomy" was a descriptive phrase in the old book* It does not occur as such in this new one, but is replaced, partially at least, by "surface anatomy."

Everyone who opens this twenty-fifth edition will be struck by the "likeness" of Henry Gray The head is that of a young man with excellent features The eyes are soft, almost poetic, yet brilliant, the nose just a trifle too broad, the mouth firmly horizontal with no Cupid's bow effect. The forehead is of average height, and the head is covered with a mass of dark hair neatly parted over the left eye The chin is firm and nestles down into a flaring upstanding white collar about which an Ascot tie with pin is neatly draped

Born in 1827, little is known of Gray's early life or family. At the age of 18 (May 6, 1845) he entered St George's Hospital, London, as a "perpetual student," a phrase which seems to fit him well since he must have worked almost constantly at dissection, drawing, and description of his findings At 21, while still a student, he was awarded the triennial prize offered by the Royal College of Surgeons for any essay entitled "The Origin, Connections and Distribution of the Nerves to the Human Eye and its Appendages, Illustrated by Comparative Dissections of the Eye in Other Vertebrate Animals" At 25 (1852) he was elected a Fellow of the Royal Society A year later, he received the Astley Cooper prize of 300 guineas for his descriptive paper on "The Structure and Use of the Spleen"

Gray was curator of the Museum at St George's, taught anatomy there, and was about to be appointed "assistant surgeon," when he was cut down by smallpox while attending a nephew. Thus at 34, in the fruitful years his life was brought to an end by a preventable disease. His name, however, will illumine the pages of medical history enduringly

Many editors have revised and annotated Gray's Anatomy for many years The latest editor is Dr Charles Mayo Goss who has made extensive changes in the section which deals with muscles and *fasciae The nerve* supply *and actions* of each muscle are stated independently of the group Much of this has come from independent research by Dr. Goss and other authorities, and every effort has been made to bring a practical working tool to teacher and student alike Dr Goss has made embryology a matter of special personal interest It is therefore quite proper that some 57 pages are given to this subject, plus a page of bibliography Then come sections on osteology, joints, ligaments, muscles and fasciae, a full and complete discourse on the vascular system, with appropriate space allotted to the respiratory, digestive and urogenital systems, and the ductless glands

In the light of current interest in psychosomatic medicine, which must be based on a study of the structure and functions of the autonomic or vegetative nervous system, pages 997 to 1022 are of peculiar interest, since this system innervates all the smooth muscles, the various glands of the body, and the striated muscle of the heart It is divided into two systems the craniosacral or parasympathetic, and the thoracolumbar or sympathetic Some viscera and organs receive double autonomic innervation, one from each of the two classifications Most of our knowledge of the function of the autonomic nervous system has been acquired through application of drugs, especially nicotine, to the connections or synapses between the preganglionic and postganglionic fibers Nicotine injected into the blood stream causes all such synapses to become paralyzed Application to a ganglion paralyzes that particular ganglion only.

The terminology is still somewhat confused, but we now know that the central nervous system holds control, so that the passions, that is, worry, anger, hate, etc., directly influence this so-called autonomic system, giving rise to "upsets" of various kinds which may lead the examiner to mistaken diagnoses. There is still need for further intensive study of the anatomy and physiology of this relatively obscure system.

The publishers have done an excellent job of bookmaking in spite of the six pounds of book which must be pushed around. This edition is a highly worthy successor to the many which have preceded it.

Atlas of Plastic Surgery. By Morton I. Berson, New York, Grune & Stratton, 1948. Using a minimum of phraseology, Berson has succeeded in creating a work which ably highlights the essential steps in the more common plastic procedures. The double-column format lends itself well to an atlas type of presentation, with illustrations placed in the outside columns and corresponding text in the inner ones. The drawings are schematic, and occasionally are not as clear as they might be.

The subject matter is reasonably comprehensive, but omits such genito-urinary conditions as hypospadias, bladder exstrophy and vaginal atresia.

While many surgeons may disagree with one or another of the various technics presented, in the main all will agree that this Atlas constitutes a desirable innovation, and future publications should round out and perfect the trend initiated here.

Medullary Nailing of Küntscher. By Lorenz Böhler, Transl. by Hans Tretter, Baltimore, The Williams & Wilkins Company, 1948. American physicians who have been trained in the most modern technics of treating fractures, have only recently begun to test the principle of intramedullary nailing which was first described by Küntscher in 1940. During World War II, necessity—too little plaster of Paris, too few surgeons, and a great dearth of hospital beds—forced German physicians to seek the most simple and least time-consuming methods of treating fractures of the long bones.

Thousands of German soldiers and, toward the end of the war many American soldiers who had been taken prisoner after having suffered combat fractures, were treated with the Küntscher nail. Some of these American boys were flown back to the United States shortly after the ground lost by the Allied Forces in the Battle of the Bulge had been retaken. These men had been moved by stretcher, ambulance and plane with a minimum of physical pain and discomfort. The soldier patients themselves were enthusiastic about the method.

In this richly illustrated book which has been admirably translated by Hans Tretter, Böhler describes indications for, contraindications to, and the method of medullary nailing. He does not attempt to gloss over the dangers which may attend this method of treatment. Complications which may arise as a result of medullary nailing are numerous, varied, and serious. Every surgeon whose work includes the treatment of fractures, and who is sufficiently trained in the principles of orthopedic surgery to justify the employment of open surgery, will want this book in his library.

Essentials of Pathology. By Lawrence W. Smith and Edwin S. Gault, Philadelphia, The Blakiston Company, 1948. This teaching text has been designed primarily to give the undergraduate an opportunity to grasp the fundamentals of pathology. In this purpose, the authors have achieved singular success.

The presentation of the material is quite unique, great use being made of the case-history method of teaching, a plan rarely seen in other textbooks of pathology. The reader can thus coordinate the clinical features with the corresponding pathologic findings. This in turn creates a vivid impression which will not readily be forgotten.

Another ingenious device of which the authors made good use is the placing of all illustrations on the right-hand page with the corresponding text on the left-hand page. This results in the formation of what might be termed an atlas, and aids greatly in the teaching value of the text.

Smith and Gault have wisely included very comprehensive sections on parasitology and oncology and more than one might expect from an elementary text of pathology. Moreover, they have [illegible] a great deal of relatively minor material, thus aiding in keeping the size of the text within [illegible]. The usual system of material arrangement has been followed, the first portion [illegible] devoted to general considerations while the remainder deals with systemic pathology. [illegible] as an excellent book for all medical students embarking upon the study [illegible]

Diseases of the Ear, Nose and Throat By W W Morrison, New York Appleton Century Crofts, Inc, 1948 This is one of the finest books on otorhinolaryngology that the reviewer has ever been privileged to behold While retaining that desirable quality—conciseness—the author still succeeds in presenting a comprehensive account of his subject After devoting the preliminary chapters to general considerations, Morrison proceeds to the particular, describing the various affections which beset the ear, nose, sinuses, throat and respiratory passages At the beginning of each section, the reader receives due orientation as regards basic anatomy and physiology The remainder of the presentation is replete with terse, clinical information Particularly praiseworthy is the chapter on allergic diseases of the respiratory tract, although the entire book is of uniform excellence

The illustrations, by the author himself, were clearly designed for instruction rather than beauty This purpose they serve very well

Operative technic has been reduced to its barest outlines, as befits an elementary text on any surgical specialty

All in all, this work is unreservedly recommended to undergraduates, practitioners and others interested in the subject, including professional otolaryngologists

Modern Surgery of the Hip By Rene Charry, Paris G Doin & Co, 1948 This very excellent treatise is devoted to the roentgenographic study of the normal and abnormal hip joint Indeed it might be considered a plea for the routine use of lateral projections in the roentgenologic investigation of the hip and gives a detailed account of how best to secure such views The book contains some of the finest lateral x rays of the hip that this reviewer has ever seen

In addition, the author deals with the surgical therapy of common affections of the hip joint such as chronic subluxation, arthritis deformans tuberculosis, osteochondritis dissecans residual coxa vara in the adult, fractures of the neck etc Many of the surgical technics described were devised by the author, and could well be employed with profit by workers on this side of the water

This book is warmly recommended to radiologists and orthopedic surgeons

Practical Bacteriology, Hematology, and Parasitology By E R Stitt, Paul W Clough, Sara E Branham, and contributors, Ed 10, Philadelphia, The Blakiston Company, 1948 This well known work has achieved its perfection in this, its tenth edition Comparing the new edition with the original the reviewer is profoundly impressed with the extraordinary strides made by the laboratory sciences and their tremendous impact on medical therapeusis Growing knowledge of viruses, rickettsia, antibiotics, and biometric technics has outmoded the older reference manuals on these subjects

The text is divided into four parts bacteriology, hematology, parasitology, and a final section devoted to the examination of the body fluids and organs In addition there is a 50 page appendix that is crammed with interesting and necessary facts

While the text is both comprehensive and lucid, it is felt that the book is too detailed to serve as a teaching text for the average medical student, and its true worth emerges as a ready source of reference For this purpose it can be recommended without reservation

Radiology of Bones and Joints By James F Brailsford Ed 4, Baltimore, The Williams & Wilkins Company, 1948 This classic English work on the roentgenologic diagnosis of disorders of the skeletal framework is worthy of a preeminent spot in the realm of radiologic literature With fastidious detail Brailsford has compiled an encyclopedic survey of the various pathologic lesions which involve the bones and joints of the human organism The discussion of each disease is accompanied by one or more illustrative radiographs chosen because of their characteristic appearance, hence serving as typical models of the condition under discussion Particular praise must be awarded the clarity of the reproductions, which are unrivalled

This text is more than a diagnostic aid The author not only discusses etiology and pathology but goes on to outline the most effective course of treatment for the assorted conditions described Not content with basing his opinions on his own vast personal experience, Brailsford has made exhaustive references to the pertinent literature A feature which increases the teaching value of the book as well as adds to its interest is the incorporation of sample case reports into the clinical discussions when indicated

The material is divided into two parts The first deals with regional radiography and comprises the greater portion of the book The second concerns itself with a general discussion of the pathology of bones and joints. It contains a 43-page chapter on bone tumors which should be read by all undergraduates, pathologists and surgeons, as well as radiologists.

This fourth edition does not differ much from the general plan adopted in its predecessors, except that many more radiographs are included, particularly of the serial type.

This reviewer feels that Brailsford has made a noteworthy contribution to radiologic literature and that his work should constitute a standard reference.

Management of Common Gastrointestinal Diseases. By Thomas A. Johnson, Philadelphia, J. B. Lippincott Company, 1948. This book is the latest of the American Practitioner Series to be released. Under the editorship of Johnson, the work represents the compilation of 16 separate contributions, each being a complete essay in itself on some well-known aspect of gastroenterology though the text does not profess to cover the entire field of gastroenterology. The contributors are men eminent in their respective fields, and they speak with authority and timeliness.

As a survey of the commoner disorders of the gastrointestinal tract, this book is heartily recommended. In particular, it should suit the needs of the general practitioner and perhaps the medical undergraduate.

Coronary Heart Disease. By A. Carlson Ernstene, Springfield, Illinois, Charles C Thomas, 1948. In this monograph of the series, "American Lectures in Circulation," the author has divided the subject matter into seven chapters dealing with angina pectoris, acute myocardial infarction, acute coronary failure, paroxysmal cardiac dyspnea, heart block and disturbances of cardiac rhythm, congestive heart failure, and the risk of anesthesia and surgical operation in patients with coronary disease.

In the introduction a short discussion is given of the physiopathology of coronary artery disease.

While all of the material is presented interestingly, the reviewer was particularly attracted by the chapter on acute coronary failure, which is set forth as a separate entity. The practitioner will find this chapter quite enlightening since it clarifies a situation encountered frequently, and which may have proved puzzling from the standpoint of therapy.

The one factor missing from the text is a full discussion of the bed-rest requirements after acute myocardial infarction. This oft-battled question is dismissed with a single comment regarding the time the patient should remain in bed, and there is no comment to the effect that the period of time at rest may vary with the severity of the attack.

The subject of digitalis therapy in acute myocardial infarction is well presented, but the matter of aminophylline and like drugs is only mentioned briefly without discussion of the actual worth of these drugs.

This little text is a valuable addition to the library of the specialist and the general practitioner because it provides a comprehensive account of the whole subject of coronary artery disease in an easily read text of proper brevity.

Treatment of Heart Disease. By William A. Brams, Philadelphia, W. B. Saunders Company, 1948. This small concise volume is an excellent manual for both the cardiologist and the general practitioner. The author has purposely deleted lengthy discussions of debatable problems in treatment, and has substituted his own experiences in therapy. He has carried this method into the first chapter which includes the use of digitalis, mercurial diuretics, xanthines, quinidine, oxygen, and hypnotics and sedatives; these agents are covered in 50 pages, and where it was possible, the therapeutic rules were set down in syllogistic fashion, leaving little doubt as to the correct procedure. The reviewer would have liked comment on the squill derivatives in this first section.

The next chapter concerns the therapy of congestive heart failure and in addition to the complete review of procedure, drugs, and equipment, many of the little niceties in rendering the patient comfortable are included. It is noteworthy that the author has not fully accepted the newer crystalline [illegible] derivatives such as digitoxin and digoxin to replace the powdered leaf, although he discusses [illegible] use.

Following these sections are chapters on diseases of the coronary arteries, treatment of disturbances [illegible] rate and rhythm, disturbances of conduction, infectious disease of the heart and aorta, [illegible] malformations, diseases of the pericardium, hypertension, endocrine and metabolic disorders, [illegible], vitamin deficiencies, the heart in pregnancy, and surgery and heart disease.

This last section is quite complete and includes discussion of every type of heart disease with relation to surgery and anesthesia, and prognosis

To the reviewer the most attractive element about the book is its modern point of view, including the section in which the author comments on the minimal benefit to be derived from the xanthine drugs The internist and the general practitioner will certainly glean much information from this little manual which embodies the experiences of an excellent therapeutist in the field of cardiology.

Polio and Its Problems. By Roland H Berg, Philadelphia, J. B Lippincott Company, 1948 This book has been written for the lay public, and it endeavors to present an honest and accurate account of all the available information pertinent to infantile paralysis that would be of interest to the laity Starting with the impact on America of the polio outbreak in 1916, the author has traced the growing knowledge, such as it is, of this disabling disease to its present status The language is nontechnical the style is facile, and the lay reader will have no difficulty in understanding the text

Abstracts from Current Literature

Differential Diagnosis Between Essential Parenchymal Hepatic Disease and Primary and Recurrent Cases of Cholecystitis and Cholelithiasis, A. O. Wilensky, Rev. Gastroenterol. 15:619, Aug., 1948. The author summarizes his views as follows: "Because of the easily accessible aid which roentgenographic methods make available, the diagnosis of calculous disease is so relatively simple that it is made commonly without due regard to the possibility of the presence of subclinical and/or latent forms of cellular disease which are truly the cause of the clinical manifestations, or in which the calculi are unimportant items. The problem is increasing in frequency and the two factors contributing most largely to this are the prevalent use of blood and plasma transfusions and the presently occurring extraordinarily large number of cases of virus and serum hepatitis. The only available methods of differentiation are studies of hepatic function and inasmuch as the degree of dysfunction may not be large, or may not be present and simultaneously involve all forms of functional activity, any variation from the normal, even though involving only a single function, or of small or minimal extent should be scrutinized carefully for the possible indication of hepatic cellular disease. In this regard, the presence of any enlargement of the spleen, or the presence of any abnormal pancreatic function should increase one's apprehension that hepatic cellular disease is present.

Transition of Pancreatic Edema into Pancreatic Necrosis, H. L. Popper, H. Necheles, and Kemper C. Russell, Surg., Gynec. & Obst. 87:79, July, 1948. On the basis of experimental studies it was found that pancreatic edema and acute pancreatitis or pancreatic necrosis are not merely different degrees of the same process but that another pathogenic factor is necessary to transform one into the other. In animal experiments such transformation of pancreatic edema into pancreatitis or pancreatic necrosis was attained by temporary occlusion of the main pancreatic artery. Local vasospasm and ischemia may play a part in the development of clinical cases of acute pancreatitis. To promote disappearance of the [illegible] seems best to administer spasmolytics [illegible] the sphincter of Oddi, to prevent [illegible] of the external secretion of the [illegible] its active inhibition. [illegible] to prevent local ischemia [illegible] to avoid medication that has a vasoconstrictor effect in the splanchnic area; papaverine may be of value.

Factors Influencing Mortality from Acute Perforated Peptic Ulcers, William T. McElhinney and Charles E. Holzer, Jr., Surg., Gynec. & Obst. 87:85, July, 1948. A group of 336 cases of acute gastroduodenal perforation in a large general hospital is reported. The mortality rate has shown a progressive decline from 21 per cent to 10.7 per cent in the period 1935 to 1946. Under combined penicillin and sulfadiazine therapy, the mortality rate has dropped to 0 per cent in patients treated in the first 6 hours and to 7.5 per cent in those treated between 6 and 12 hours. Since bacterial infection is a most important factor in mortality, penicillin and sulfadiazine therapy should be started at the time of diagnosis. Of the fatal cases a positive culture from the peritoneal cavity was obtained in 88 per cent, and 75 per cent of these positive cultures contained a streptococcus. Generalized peritonitis was the greatest single cause of death.

Bilateral Vagotomy in a Painful Gastric Syndrome After Gastric Resection with Recovery, M. Bogetti, Boll. e Mem. della Soc. Piemontese di Chir. 18:119, 1948. The author performed a bilateral vagotomy on a 43-year-old woman in whom two years previously a gastroenterostomy for a duodenal ulcer had been done. One year later the anastomosis was disconnected and a partial gastric resection carried out because of persistence of pain. The second operation failed to give relief. Complete recovery, however, followed a bilateral vagotomy.

The author considers vagotomy as less dangerous and technically easier than an extensive gastric resection. The number of recurrences is smaller and the operation is less mutilating because the secretory, motor, and endocrine (antianemic functions of the stomach are preserved.

Low Anterior Segmental Resection with or without Colostomy, Charles W. Mayo and Robert S. Smith, Ann. Surg. 127:1046, May, 1948. In 100 *consecutive cases* anterior segmental resection with colostomy and end-to-end anastomosis between sigmoid and rectum was performed. In another series of 100 consecutive cases the operation was essentially similar except that colostomy was not performed. In general, the line of lymphatic spread in the upper portion of the rectum and the rectosigmoid is upward. In those with colostomy the mortality rate was 3 per cent, in those without colostomy, 6 per cent Four of the deaths were due to embolism or were cardiovascular in origin

Current Trends in Surgery of the Distal Colon and Rectum for Cancer, A Stephens Graham Ann Surg 127 1022, May, 1948 A survey by questionnaire was undertaken to determine current trends in the surgical treatment of cancer of the distal colon and rectum as practiced by 50 surgeons with relatively large experience in this field The opinions of 10 of these whose preeminence few would question have been contrasted with those of the remainder of the group The departments of surgery of 31 medical schools and seven clinics are represented

The author claims to have noted a decided trend away from extraperitoneal, multistage operations for lesions of the distal colon Forty two, or 84 per cent, indicated regular use of chemotherapeutic agents Forty one, or 82 per cent, indicate the Miles operation as the procedure of choice both for lesions of the rectum and rectosigmoid From the questionnaires it would seem that a trend toward operations upon the rectum with preservation of the anal sphincter is declining Another trend, however, that toward single stage operations in every segment of the large intestine, seems to be growing This is accomplished for the transverse, descending and sigmoid portions of the colon by immediate anastomosis after resection and for the rectosigmoid and rectum by a one stage combined abdominoperineal resection

Effect of Streptomycin in Experimental Strangulation of the Bowel, H S Davis, J Gaster, R L Marsh, and P A Pritel, Surg, Gynec & Obst 87 63, July, 1948 This study was based on experimental strangulation of the bowel by devascularization Bacterial growth in the devascularized bowel wall was the major factor leading to perforation and gangrene of the bowel Prevention of the growth of bacteria by streptomycin was the mechanism underlying the prolongation of life in the treated rabbits Streptomycin in doses of 40 mg per kilogram of body weight daily lowered the mortality rate, and 100 mg per kilogram of body weight daily prevented any mortality On the basis of these experiments the authors suggest that the clinical administraiton of streptomycin might be a useful adjunct in the treatment of strangulated intestinal obstruction, especially of the type due to acute arterial mesenteric thrombosis or embolism Since the therapeutic value of streptomycin is dependent upon the length of strangulated bowel, and since it is impossible to predict the extent of strangulation, streptomycin should be regarded as an adjunct to and not as a substitute for surgery

Principles Old and New of Resection of the Colon for Carcinoma, Leland S McKittrick, Surg, Gynec & Obst 87 15, July, 1948 A study was made of the immediate results following resection of the colon for cancer for the past 16 years The year 1942 is used as the transition year from the earlier to the present methods, showing striking drop in mortality rate, and the striking transition from staged operations to resection and primary anastomosis A continuance of present methods seems justified by the mortality rate of 3 6 per cent for 110 operations with primary anastomosis The basic principles for resection of the colon for cancer are listed as the following (1) Proper preparation of the patient (2) Optimum exposure of the segment of colon to be excised (3) Adequate immobilization of bowel (4) Adequate cancer operation (5) Free blood supply to both segments (6) Avoidance of tension on suture line (7) Proximal complete colostomy, if adequacy of suture line or blood supply is in doubt

Management of Ileosigmoidal Fistula in Diverticulitis, R Russell Best, Surgery, 24 30, July, 1948 In the four cases reported, operation revealed a large inflammatory mass occupying the midabdomen at the level of the sacral promontory From palpation and appearance it is difficult to differentiate an inflammatory mass secondary to a perforated diverticulum of the sigmoid and adherent small bowel from a large infiltrating carcinoma of the sigmoid with small bowel involvement and a probable associated abscess In the four cases a one stage procedure usually preferable, was precluded because of the severe inflammatory reaction, density of adhesions, degree of edema, and the general condition of the patient

In the presence of an ileosigmoidal fistula ileal fecal material must be diverted from the sigmoid and rectum by enteroenterostomy Complete diversion by section of the two loops might lead to establishment of blind bowel loops and lethal outcome A colostomy of the transverse colon effects relief of the sigmoidal obstruction and permits the inflammatory reaction of the diverticulitis of the sigmoid to subside Further surgery at a later date depends on the change in pathologic condition and the wishes of the patient

Diagnostically, if obstruction threatens, barium should not be given by mouth, and a barium enema should be given very slowly and under low pressure. The complexities of diagnosis are not always resolved by barium studies.

Surgical Treatment of Ulcerative Colitis, Richard B. Cattell and Ernest Sachs, Jr., J.A.M.A., 137:929, July 10, 1948. Judging from their experience over 20 years the authors believe that when surgical intervention is necessary in ulcerative colitis, ileostomy will be required and in most cases must be followed by removal of the colon. In the authors' series the operative mortality was 11.8 per cent, with two-thirds of the fatalities occurring in patients who had an emergency ileostomy.

Jejunal Diverticulosis Complicated by the Development of Jejunocolic and Jejunojejunal Fistulas, Carrington Williams and Lewis H. Bosher, Jr., Ann. Surg. 127:918, May, 1948. According to the literature, surgical complications of jejunal diverticulosis are very rare, and approximately half of the recorded complications have resulted from diverticulitis with its concomitants. The authors present a case of diverticulosis of the jejunum with jejunocolic and jejunojejunal fistula. It is believed that in their case the symptoms presented resulted primarily from the presence of jejunocolic fistulas. In general, anorexia and intermittent vomiting may be attributed to the presence of multiple diverticula, and a few patients will complain of abdominal discomfort, flatulence, and epigastric pain tending to radiate to the left of the umbilicus. Radiologic diagnosis is frequently difficult. In the authors' case, although many jejunal diverticula were present only a few were demonstrated by gastrointestinal x-ray study. The occurrence of multiple jejunocolic and jejunojejunal fistulas in this case may be attributed to the presence of multiple diverticula along the lateral and antimesenteric borders as well as the usual mesenteric location.

Tumors of the Small Intestine, H. A. Weinberger and Rudolph M. Paltauf, Surgery, 24:35, July, 1948. Though small bowel tumors are of rare occurrence, comparatively, no ingenuity should be neglected in diagnosis and treatment since in this region they are extremely lethal. Twenty cases of primary tumors of the small intestine are analyzed, omitting ampullary tumors of the duodenum. In the malignant tumor group there are [illegible] instances of fulminating onset; in the benign tumor group symptoms varied from [illegible] onset due to sudden intestinal [illegible]. **Symptoms:** In the [illegible] group the chief complaint was [illegible] epigastric or lower quadrant, intermittent aching, and vaguely as epigastric discomfort or indigestion. In the benign tumor group the pain was usually in the lower quadrant regardless of segment involved, with diarrhea and/or constipation in several. The wide range of symptoms and signs suggests that any bizarre intestinal complaints for which the usual methods of investigation offer no explanation must be investigated by pattern x-rays. No patient with persistent, unexplained gastrointestinal complaints should be discharged without considering the possibility of a small bowel lesion. In the presence of bleeding the burden of proof is upon the physician to demonstrate its etiology, assuming that the statisically common pathologic entities of the gastroduodenal portions and large bowel have been excluded. Chronic bleeding with a subjective ulcer syndrome without x-ray manifestations of a gastroduodenal inflammatory lesion may be accountable to a small bowel tumor. In view of the frequently inconclusive x-ray findings of small bowel pathology it may be advisable to resort more frequently to exploratory laparotomy.

Oil-Soluble Anesthetics in Proctology, William Lieberman, Rev. Gastroenterol. 15:520, Aug., 1948. The anesthetic used in spastic sphincter, fissure-in-ano, and for prevention of postoperative pain after hemorrhoidectomy, coccygodynia and, experimentally, for the pain of inoperable carcinoma was nupercaine with benzyl alcohol and phenol in oil. In order to prevent sloughing, pooling of the anesthetic must be avoided. A 21- or 22-gauge needle which prevents too rapid flow, assists in distributing the solution in droplets. A larger caliber needle is required to withdraw the solution from the ampule. During injection the needle should be kept in constant motion, being partially withdrawn and inserted in different directions. Further, to prevent pooling at the point of insertion, the injection should not be begun too near the point of insertion, and after injection is complete a terminal injection of a minute amount of air to prevent droplets being left intradermally in the track made by the withdrawal of the needle should be made. The injections are contraindicated in the presence of infection, and must be used with more caution—smaller amounts at longer intervals—in the aged, the debilitated and in patients with constitutional diseases such as diabetes.

Ileoterminal Adhesions, L. Lazzarini, Boll. e Mem. della Soc. Piemontese di Chir. 18:84, 1948. The term ileoterminal adhesions is applied by the author to abnormal attachment of the lowest loop of the ileum Such a condition is usually found at a distance of 10 to 15 cm from the ileocecal junction and involves a segment of the gut 5 to 10 cm long Two types may be distinguished (1) adhesion of the ileum and (2) adhesion involving the ileum and cecum As a rule the appendix does not participate in the condition The shortening of the peritoneal fold may be limited to the mesentery or may involve the intestine, so that the following groups may be established (1) mesenteric adhesions—partial when only a portion of the mesentery is shortened and marginal ileal when the process involves the entire mesentery so that the gut appears to be attached directly to the root of the mesentery (2) iliac adhesions—partial when only a portion of the juxtamesenteric part of the ileum appears attached to the root of the mesentery and total when the entire circumference of the gut with the exception of the contramesenteric region is attached to the root of the mesentery

The pathogenesis of the condition is related to a faulty evolution of the mesentery and not to postnatal inflammatory processes The treatment consists of restitution of the physiologic mobility of the gut The involved segment is liberated from its insertion at the posterior abdominal wall and peritonealized, care being taken not to injure the mesenteric vessels

The Mediastinum Boll e Mem della Soc Piemontese di Chir 7 621 837, June July 1947 This entire issue is devoted to the mediastinum The anatomy, differential diagnosis and treatment of various conditions involving the mediastinum are discussed in detail In a paper titled 'Clinical Diagnosis of the Mediastinitis Syndrome" Enrico Angelesio reviews briefly the essential anatomy presenting differential diagnosis of the various pathologic entities in more detail

Gian Carlo Parenti's paper on "Surgical Anatomy of the Mediastinum" is an abstract of what will be published as a monograph on his original anatomic research and which will be illustrated in color A very comprehensive description is given of the anatomy and boundaries of the mediastinum and of the contents of the anterior and posterior mediastinum

Antonio Bobbio presented a study of 'Surgical Aspects of the Mediastinum ' The historical and bibliographic references are very well organized with discussions of the various methods The midsternal, midsternal inferior, and midsternal superior approaches to the anterior mediastinum and the extrapleural and transpleural approaches to the posterior mediastinum are illustrated and discussed

He reported 12 cases operated upon in 10 years Eight were of the posterior mediastinum 2 of the anterior mediastinum and 2 were so diffuse that the identification of their source was impossible Four cases died within one week of surgery and four others died within the first year either due to the original lesion or the result of the surgical intervention

In a preliminary report Edmondo Malan discusses The Retromediastinal Prevertebral Space from a surgical standpoint

Discussing Reflex Pulmonary Spasm' F Morin and Dr G Dei Poli expressed the view that this phenomenon occurs more frequently in operative interventions of the right thoracic cage and the posterior mediastinum because of the presence of the pneumocardiac nerve plexus on the right side Traction on the pedicle of the right lung in pneumonectomy produces a rapid fall in blood pressure and an associated pulmonary spasm which frequently is fatal

Pier Luigi Bruzzone in a paper on Early Reflex Symptoms of Mediastinal Lesions Which Originate in the Major Digestive and Respiratory Pathways and Ear stressed early signs and symptoms of an indistinct nature that usually are precursors of more serious and evident signs of mediastinal disease Their careful investigation and their correct interpretation saves time suffering and give a more favorable prognosis in these cases The illustrative cases reported were mediastinal tumor luetic aortitis with adhesions to the esophagus congenital mediastinal band cardiac decompensation with mediastinal pressure esophageal diverticulum

A second paper by the same author, "Endoscopy in the Surgery of the Mediastinum" presents an exhaustive review of the literature Indications and contraindications to bronchoscopy and endoscopy are given and the dangers and limitations of these diagnostic means are enumerated

In a paper on 'Clinical Studies of Posttraumatic Generalized Subcutaneous Emphysema" Renzo Castagna described such a case with spontaneous recovery This case was presented because of the extensive involvement of the head neck chest thorax arms and upper thirds of both femurs which had resulted from an accident with broken ribs on the right side of the chest, associated with a hemothorax

In experimental work on dogs Giorgio Dei Poli confirmed the conclusions of R Matas (Arch Surg p 336, 1924) to the effect that the mediastinum in dogs is very movable and that it cannot be compared to the mediastinum in man because of this one basic difference After study enema should be given very slowly and under low pressure. The complexities of diagnosis are not always resolved by barium studies.

Surgical Treatment of Ulcerative Colitis, Richard B. Cattell and Ernest Sachs, Jr., J.A.M.A., 137:929, July 10, 1948. Judging from their experience over 20 years the authors believe that when surgical intervention is necessary in ulcerative colitis, ileostomy will be required and in most cases must be followed by removal of the colon. In the authors' series the operative mortality was 11.8 per cent, with two-thirds of the fatalities occurring in patients who had an emergency ileostomy.

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In Memoriam

GOESTA LUNDH

M.D., F.I.C.S.

On the 31st of October 1948 Goesta Lundh, chief surgeon of the Lundskrona hospital, Sweden, died as a result of hypertension at the age of 56.

Goesta Lundh is well known to the Fellows of the International College of Surgeons. His great interest in the development of the College was noted and his contributions to THE JOURNAL OF THE INTERNATIONAL COLLEGE OF SURGEONS were read with avidity and pleasure.

Goesta Lundh was known and honored among the surgeons of his native country. His keen interest in the surgery and treatment of tuberculosis of the lungs and his untiring efforts in that direction have made his name known throughout the civilized world. His thorough knowledge and critical evaluation of operative procedures were a delight to read and follow. It may be mentioned that it was Goesta Lundh who pioneered and popularized extrapleural pneumothorax in the treatment of pulmonary tuberculosis. It may be mentioned further that extrapleural pneumothorax was accepted with a furor of enthusiasm in the United States and was then completely discarded. And now through the persistent conviction of Lundh emphasizing its value by pen, spoken word and clinical demonstrations, it is an accepted procedure in selected cases of pulmonary tuberculosis.

Those who were privileged to call Goesta Lundh friend appreciate his idealism, his keen sense of values, his inspiring personality and his sunny sense of humor. In the present maelstrom and almost cataclysmic onrush of world unrest Goesta Lundh stood steadfast as a rock of human understanding and worthwhile endeavor. He evaluated with justice and was ever interested in the welfare of humanity, regardless of any other consideration. He radiated strength and at the same time he was possessed of a sense of solidarity and mature judgment which he dispensed to all. None of his friends, students or patients could resist Lundh's engaging and genial personality.

The International College of Surgeons mourns the loss of one of its best!

RUDOLF NISSEN, M.D.

JOHN BAPTIST CASALE

M.D., F.I.C.S.

It is with regret that we record the death on July 9, 1948, of John Baptist Casale of Newark, New Jersey, at the age of 58. Dr. Casale received his medical education at the College of Physicians and Surgeons of Columbia University. At the time of his death he was Attending Surgical Chief to St. Michael's Hospital and to Columbus Hospital, both of Newark, N. J. In addition to Fellowship in the American Medical Association and the International College of Surgeons, Dr. Casale also belonged to the New Jersey Society of Surgeons and the Essex County Anatomical and Pathological Society.

ELBERT GLEANARD WOOD

M.D., A.I.C.S.

In 1947 the International College of Surgeons lost through death its Associate, Dr. Elbert Gleanard Wood. Dr. Wood received his medical education at the University of Tennessee, and practiced surgery in Knoxville. His society affiliations, in addition to the American Medical Association and the International College of Surgeons, were the Southern Medical Association, Southeastern Surgical Congress and Tennessee State and County Medical Societies. His hospital connections included the Fort Sanders Hospital and the Knoxville General Hospital.

ing various domestic animals he concluded that the mediastinum in rabbits most closely resembles the mediastinum in man and suggests that for this reason the rabbit is a much better experimental animal for comparative studies.

Dupuytren's Contracture. Tord Skoog, Acta Chir. Scand. (Supp.) 96:190, 1948. To the most comprehensive review of the extensive literature on this condition the author adds further information drawn from his own great experience. This disabling condition is discussed from every conceivable angle that might possibly shed light on it. Starting with the normal anatomy and embryology of the palmar aponeurosis, the subject material then covers the incidence, symptomatology, pathology and pathogenesis, etiology, and treatment—both conservative and operative—of Dupuytren's Contracture. Some interesting points are made concerning the relationship of this disease to epilepsy, and it is compared with similar connective tissue changes occurring elsewhere in the body.

New Orientation in Surgery of Prostatic Hypertrophy. L. Migliardi, Boll. e Mem. della Soc. Piemontese di Chir. 18:92, 1948. Suprapubic prostatectomy in two stages should be reserved for senile patients, those in whom the cardiovascular or renal condition is poor. Perineal prostatectomy not infrequently is followed by sexual impotence. In view of such drawbacks of the customary operative methods, Millin's prevesical or retropubic prostatectomy is a very promising procedure. Its technic is not different, except in obese individuals in whom a particularly careful hemostasis is required. The enucleation of the gland is easy, especially if a hypertrophied organ of adenomatous character is present. Small, fibrotic glands should be approached through the transvesical route. The attempt to remove them by the retropubic method may discredit Millin's operation. Serious postoperative hemorrhage is extremely rare and the results of the procedure very satisfactory. The observation period is too short to permit forming a definite opinion as to remote results.

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On the 31st of October 1948, Goesta Lundh, chief surgeon of the Lundskrona hospital, Sweden, died as a result of hypertension at the age of 56.

Goesta Lundh is well-known to the Fellows of the International College of Surgeons. His great interest in the development of the College was noted and his contributions to THE JOURNAL OF THE INTERNATIONAL COLLEGE OF SURGEONS were read with avidity and pleasure.

Goesta Lundh was known and honored among the surgeons of his native country. His keen interest in the surgery and treatment of tuberculosis of the lungs, and his untiring efforts in that direction have made his name known throughout the civilized world. His thorough knowledge and critical evaluation of operative procedures were a delight to read and follow. It may be mentioned that it was Goesta Lundh who pioneered and popularized extrapleural pneumothorax in the treatment of pulmonary tuberculosis. It may be mentioned further that extrapleural pneumothorax was accepted with a fervor of enthusiasm in the United States and was then completely discarded. And now through the persistent conviction of Lundh emphasizing its value by pen, spoken word and clinical demonstrations, it is an accepted procedure in selected cases of pulmonary tuberculosis.

Those who were privileged to call Goesta Lundh friend, appreciate his idealism, his keen sense of values, his inspiring personality, and his sunny sense of humor. In the present maelstrom and almost cataclysmic onrush of world unrest, Goesta Lundh stood steadfast as a rock of human understanding and worthwhile endeavor. He evaluated with justice and was ever interested in the welfare of humanity, regardless of any other consideration. He radiated strength and, at the same time he was possessed of a sense of solidarity and mature judgment which he dispensed to all. None of his friends, students or patients could resist Lundh's engaging and genial personality.

The International College of Surgeons mourns the loss of one of its best!

RUDOLF NISSEN, M.D.

JOHN BAPTIST CASALE

M.D., F.I.C.S.

It is with regret that we record the death on July 9, 1948, of John Baptist Casale of Newark, New Jersey, at the age of 58. Dr. Casale received his medical education at the College of Physicians and Surgeons of Columbia University. At the time of his death he was Attending Surgical Chief to St. Michael's Hospital and to Columbus Hospital, both of Newark, N. J. In addition to Fellowship in the American Medical Association and the International College of Surgeons, Dr. Casale also belonged to the New Jersey Society of Surgeons and the Essex County Anatomical and Pathological Society.

ELBERT GLEANARD WOOD

M.D., A.I.C.S.

In 1947 the International College of Surgeons lost through death its Associate, Dr. Elbert Gleanard Wood. Dr. Wood received his medical education at the University of Tennessee, and practiced surgery in Knoxville. His society affiliations, in addition to the American Medical Association and the International College of Surgeons, were the Southern Medical Association, South [illegible] Congress and Tennessee State and County Medical Societies. His hospital connectio[illegible] S[illegible] Hospital and the Knoxville General Hospital.

WILLIAM POLSON SMITH

M.D., F.I.C.S.

Dr. William Polson Smith of Columbus, Montana, died May 4, 1948, 67 years of age. Born in St. Louis, Dr. Smith received his medical education at the University of Illinois. Practicing in Montana he served as President of the Montana Public Health Association, 1936, and as President of the Montana Medical Association, 1937. He was also a member of the County Medical Society, the State Medical Society, as well as of the American Medical Association and the International College of Surgeons.

WILLIAM H. SPEER

M.D., F.A.C.S., F.I.C.S.

By the death, May 3, 1948, of Dr. William H. Speer, the International College of Surgeons loses a valued Fellow and Regent and the profession of surgery one of its most active practitioners.

Dr. Speer was born in Delaware, studied in the schools of that state and graduated from the University of Pennsylvania School of Medicine in 1910, beginning practice in 1911. He served in the Army Medical Corps in World War I and as chief of Emergency Medical Service Committee of the State Council of Defense during World War II. He exercised not only numerous duties in his profession (chief of staff of Delaware and St. Francis Hospitals, Wilmington, etc.) but also civic duties, having served as Mayor of Wilmington from 1933 to 1935, the first Democratic mayor since 1917.

JAMES CARLISLE McLEOD

M.D., F.A.C.S., F.I.C.S.

Death claimed James Carlisle McLeod on December 9, 1947, at the age of 50. Dr. McLeod was born in South Carolina, received his medical education at Cornell University Medical College and then returned to his home, there to establish the McLeod Infirmary and to become active in his community. He has numerous scientific papers to his credit and in 1945 became President-Elect of the South Carolina Medical Association. His passing is a loss of the International College of Surgeons as it is to his friends.

COLLEGE INTERNATIONAL des CHIRURGIENS

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Original Articles

The Technique of Parotidectomy

HAMILTON BAILEY, F.R.C.S., F.A.C.S., F.I.C.S., F.R.S.E
LONDON, ENGLAND

PARTIAL or complete parotidectomy is indicated for:

1. Parotid tumors
2. Congenital parotid sialectasis
3. Certain cases of tuberculous lymphadenitis of the parotid group of lymph nodes with sinus formation.
4. Intractible salivary fistula—failure of other methods of treatment

Of these indications the most frequent is parotid tumor, and it is to the complete extirpation of parotid tumors that attention particularly is directed.

There are three types of the operation: extracapsular resection, superficial lobectomy and complete parotidectomy. The widespread belief that a salivary fistula frequently follows the removal of a portion of the parotid gland is unfounded and fear of this complication need not deter the operator from excising sufficient normal parenchyma to ensure that all the diseased parotid tissue has been removed intact.

FULL EXPOSURE OF THE PAROTID GLAND IS REQUIRED

Many parotid tumors, which on clinical examination feel circumscribed and tolerably mobile, when displayed to the light of day prove to be veritable icebergs—four-fifths being beneath the surface. Again, approximately a quarter of these neoplasms originate in the deep lobe of the parotid. In one out of every four cases there is a considerable thickness of normal parotid parenchyma and the main divisions of the facial nerve lie between the tumor and the subcutaneous surface of the gland. Furthermore even if the tumor is as small as it was believed to be before the operation and is placed comparatively superficially, it has been proven that this type of tumor frequently reappears after surgical intervention undertaken through a short skin incision.

It was the tragedy of early recurrence (due in a large measure to inadequate exposure) that brought the operative treatment of parotid tumors into disrepute. For these reasons, before an attempt is made to remove any parotid tumor, full exposure of the parotid gland is necessary. It is only when the whole parotid gland has been displayed, and sometimes only after the superficial lobe has been rendered mobile (so that its thickness can be palpated between the finger and the thumb), that the true location and extent of the tumor

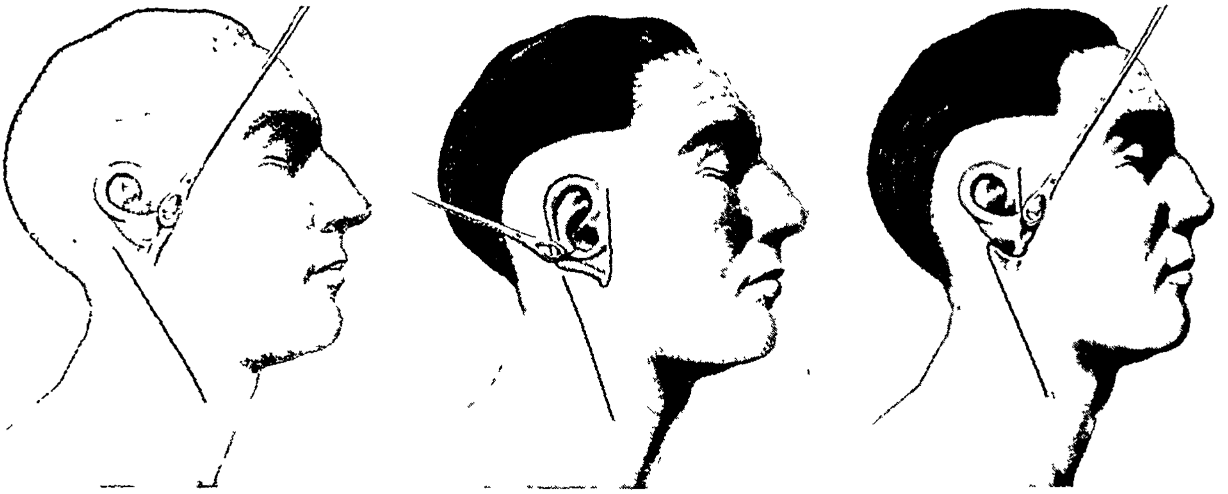

Fig. 1. A. The cervical incision. B. The commencement of the facial incision. C. Completion which enables a large faciocervical skin flap to be dissected forward.

can be assessed with the degree of accuracy necessary to formulate a reasoned opinion upon which of the three varieties of parotidectomy should be performed.

Ligation of the External Carotid Artery: This is desirable if not an indispensable preliminary step in parotidectomy. Even after its arterial supply has been cut off, venous hemorrhage from the gland during the operation is considerable. Because hemostasis must be perfect if fine filaments of the facial nerve and often the thin capsule of a tumor are to be visualized clearly, further justification for the routine adoption of this preliminary step is superfluous.

Cervical Skin Incision: This incision about to be described is later employed to help make a large faciocervical skin flap. This cervical incision which extends from the middle of the base (not the tip) of the mastoid process to an inch (2.5 cm.) below the level of the hyoid bone is made over the anterior third of the sternomastoid muscle (Fig. 1A). The anterior edge of the sternomastoid having been freed and retracted, the bifurcation of the common carotid artery is sought. Enlarged lymph nodes encountered during the dissection are removed and saved for transmission to the pathological department. The external carotid artery is identified and ligated below its facial [illegible]

When the surgeon is assured that hemostasis of the whole wound is satisfactory, re- [illegible] removed and the edges of the wound are allowed to fall together. The neck is covered with an abdominal pack.

Facial Incision: The lobule of the ear is seized with a Lane's tissue forceps and retracted away from the face. The assistant places the flat of the hand on the face and draws the skin away from the pinna. In this way the skin over the parotid gland is stretched and steadied. A vertical incision, commencing at the level of the zygomatic arch is made very close to the pinna (Fig. 1B). It passes downward in front of the tragus and still hugging the junction of the pinna with the face, passes around the base of the lobule to join the extremity of the first incision at the base of the mastoid process (Fig. 1C).

Raising the Faciocervical Skin Flap: The cervical and the facial incisions having been joined, then a large faciocervical skin flap can be dissected forward. When the faciocervical skin has been undercut sufficiently, it is given to the assistant to hold in a swab. He is instructed to lift the flap while the undercutting proceeds. Venous hemorrhage is usually troublesome and it has been personally noted that bleeding is less when the operation is conducted under local anesthetic.

Undercutting of the skin flap continues until the buccinator muscle is seen—the whole of the superficial aspect of the parotid gland, which varies considerably in size, is now in full view.

What Operation Should Be Performed? It is at this stage that thorough palpation of the whole gland is possible, and the surgeon must make up his mind which of the following three procedures is suited to the particular case:

1. Extracapsular resection.
2. Superficial lobectomy.
3. Total parotidectomy.

EXTRACAPSULAR RESECTION

When the surface of the parotid gland has been fully exposed it is possible to form a more accurate idea of the size and location of the tumor than at a clinical examination In some cases after the faciocervical flap has been dissected up, it may become apparent that the tumor is manifestly superficial It is only with comparatively small tumors situated in the superficial lobe which are suited to straightforward extracapsular resection If any doubt exists whether the tumor is situated superficially in the superficial lobe, it is better to mobilize the superficial lobe After this procedure has been carried out the whole thickness of the gland can be palpated thoroughly between the finger and the thumb

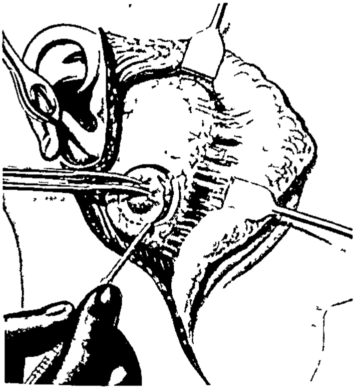

Fig 2. Extracapsular resection of a tumor in the superficial lobe of the parotid gland.

Once again the operator asks himself the question, '*What operation should be performed?*'

The objective of extracapsular resection is, as the term implies, to excise the tumor with its capsule absolutely intact. The only method of achieving this objective regularly and successfully is to sacrifice about a quarter of an inch (6 cm) of normal parotid tissue surrounding the capsule of the tumor. In order to facilitate what may be termed excision en bloc, it is permissible for the purpose of traction, to attach hemostats (Fig. 2) or other tissue grasping forceps to normal parotid tissue

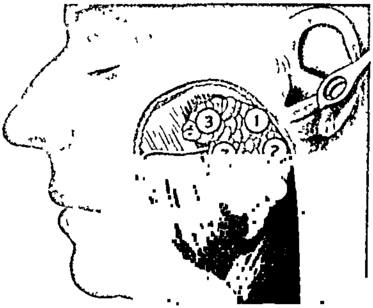

Fig 3 A plan for mobilizing the superficial lobe of the parotid gland

If this expedient is employed, on no account must the forceps be applied within a hallowed area of a quarter of an inch around the capsule, or the capsule is in imminent danger of being torn asunder During the deeper stages of the excision the best tractor is the surgeon's fingers, and a gauze swab moist with 60 percent alcohol which not only helps to prevent the tumor from slipping but will kill spilled cancer cells if by some mischance the surgeon should fail in his avowed object to preserve the integrity of the capsule.

Reliable statistics proved that in approximately 30 percent of cases, recurrence took place after excision of mixed parotid tumors and it was the small early ones that recurred more frequently than those moderately sized. If the tumor is excised with its capsule intact —and if the above technique is foll t integrity of the capsule is safegua exp of permanent cure is 10

SUPERFICIAL LOBECTOMY

Temporary Resection of The Mastoid Process: Employing a periosteal elevator the whole of the base of the mastoid process as it joins the skull proper, is cleared of pericranium. A broad chisel is taken and with one or two smart taps with the hammer, the mastoid process is severed from the skull. The musculotendinous insertion of the sternomastoid as it blends with the tip of the mastoid process is grasped with Morrant Baker forceps, and the mastoid process, with the muscle attached, is freed from the parotid fascia by sharp dissection.

When this step has been completed by suitable pulling upon the lobule of the ear, the cartilaginous auditory canal is freed from the capsule of the parotid gland. The previously inaccessible posteroinferior corner of the parotid gland can now be grasped between the finger and the thumb and raised and beneath it is a recess in which the styloid process can be palpated. It is in this recess that the main trunk of the facial nerve as it issues from the stylomastoid foramen is situated. It is seldom that the nerve can be seen readily, and at this stage of the operation it is inadvisable to disturb the region unduly in order to seek it.

Mobilizing The Superficial Lobe: (The following parenthetical numerals refer to Fig. 3). Commence by defining the periphery of the parotid. Reflect the edge (1) of the gland forward, proceeding downwards (2) dissect with a sharp scalpel and from time to time by inserting and opening the blades of a hemostat (hemostat dissection) until the rounded free posterior edge of the gland is free. Palpate the zygomatic arch; somewhere just below it lies the thinned-out periphery of the gland. Make a transverse incision through the deep fascia at (3) and define this border. This accomplished, proceed to isolate the lower border of the gland; here great variations exist. Sometimes the parotid gland has a cervical prolongation of as much as one inch (2.5 cm.). The posteroinferior corner of the gland (4) can be dissected up with some confidence, for nerve damage here is highly improbable. Seek the mandibular branch of the facial nerve (Fig. 4) as it runs over the angle of the jaw. It is also desirable to ensure that the anterior edge, (6) (7) of the parotid gland is freed from the masseter muscle and undermined sufficiently to ensure that the orbital branches of the facial nerve in particular and the buccal branches can be traced toward the main divisions of the nerve.

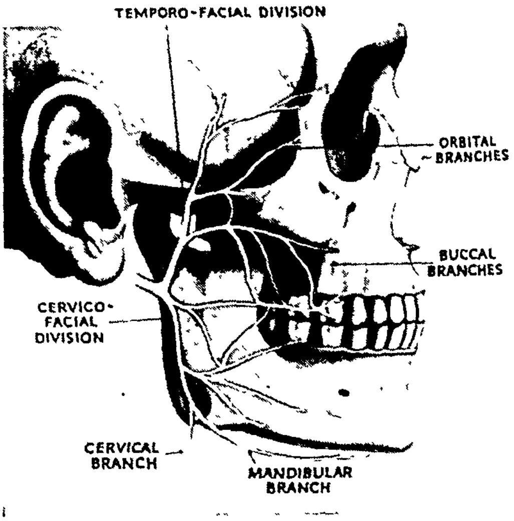

Fig. 4. The disposition of the extracranial course of the seventh nerve in relation to the mandible.

Patient hemostat dissection, aided here and there by a few touches of the scalpel and careful attention to hemostasis are the secrets of success—the most tedious and difficult part of the operation. Stensen's duct is often no larger than one of the branches of the pes anserinus and after viewing it intently scores of times, usually at this stage of the operation it is futile to suggest which of the white strings passing across this field of operation is Stensen's duct. The fact is that one of them is the duct, becoming apparent only after the isthmus of the gland has been severed.

Division of the Isthmus: If the tedious process of mobilizing the superficial lobe has been carried out effectively, the actual resection of the lobe is usually a comparatively straightforward procedure.

No attempt should be made to seek the isthmus of the parotid gland from infront, for this is much better done from below and behind.

The time has come now for the most dramatic stage of the operation. The areas (2).

(5), (4), which previously were freed thoroughly from the sternomastoid muscle and the cartilaginous auditory canal, are lifted up with the index finger applied over a swab moist with 60 percent alcohol. By means of blunt dissection with a Watson Cheyne dissector the main trunk of the facial nerve is sought. Frequently it becomes apparent almost at once.

In cases where the tumor was wedged between the mastoid and the angle of the jaw the facial trunk may be displaced medially. Sometimes the facial trunk may be so thinned and flattened as to resemble one of the bands of fibrous tissue which are not uncommonly present in the type of case under consideration, especially those in which a previous operation has been performed If blunt dissection is employed and nothing is cut without tracing it forward, the facial nerve cannot be mistaken, for it is the size of ordinary parcel string, and even if it is flattened out in this situation, it assumes its normal rounded character when it is traced forward

The nerve is followed; fortunately it rarely passes into pathological tissue Should it do so, either the nerve must be sacrificed or the pathological tissue must be cut in order to follow the nerve. Usually it requires little more than blunt dissection to trace the nerve to the isthmus and to see it bifurcate. About half an inch of the isthmus is cut and the superficial lobe is lifted up a little more; the two primary divisions are isolated; the isthmus is more deeply divided. Provided the early dissection (6), (7), (3), was carried out properly, one often finds that as soon as the superficial lobe is detached, Stensen's duct is the only connecting link of the superficial lobe with the side of the face

On a number of occasions I have been thrilled at being able to display the whole course of the seventh nerve and all its branches as clearly as they are depicted in an anatomical textbook (Fig. 5) At other times it has been noted that this or that branch has been cut, but as long as the main trunk and the temporofacial division can be followed, the end result will eventually be satisfactory If, in addition, the buccal branches are intact, the result will be good Even if some of the constituents of the pes anserinus have been cut, it does not necessarily follow that the patient will have readily noticeable facial palsy In any case the main object of the operation is to extirpate the malignant or potentially malignant tumor in such a manner that local recurrence is impossible.

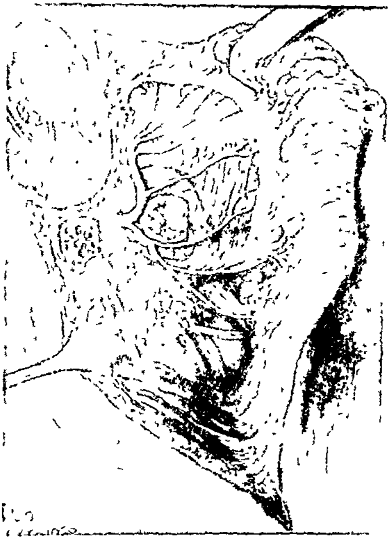

Fig 5. Superficial lobectomy completed.

REMOVAL OF THE DEEP LOBE

The facial nerve can be held aside by passing a ligature beneath it, and usually the deep lobe can be separated from the great vessels of the neck and the pharyngeal wall with comparative ease. Large tributaries of the jugular vein, particularly the common facial vein, are sometimes a source of some embarrassment. In necessary cases there is no objection to ligating the jugular vein above and below its juxtaposition to the deep lobe, but this seldom happens.

Removal of the deep lobe is not required in cases where the tumor has been removed completely in the superficial lobe. It is much easier to mobilize and resect a superfic lobe containing a tumor than it is to mobilize and resect a substantially normal superficial lobe, e.g. in a case of parotid sialectasis.

Only comparatively recently have I realized that in non-recurrent tumors of the deep lobe it is possible, by full mobilization, to dislocate the deep lobe and turn it forward from the deep recess behind the angle of the jaw. The facial nerve having been traced from the stylomastoid foramen, makes it possible to resect the deep lobe containing the tumor without much disturbance of the pes anserinus.

RECONSTITUTING THE OPERATIVE AREA

Replacing the Mastoid Process: The muscle is grasped in Morrant Baker forceps just beneath the tip of the mastoid process. In this way the sternomastoid muscle is stretched so that the mastoid process can be replaced. The mastoid process is fixed in its original position with a suitable nail.

Suturing the Faciocervical Skin Flap in Position: In the vicinity of the junction of the two skin incisions the cervicofacial skin flap will possess a narrow tongue. It is often a good practice to cut away a part, or all of this triangular piece of skin, not only to obviate possible sloughing of a portion of the skin with an inadequate blood supply, but for another important reason. After a parotid gland bearing a tumor has been removed, there is *too much skin* available. In other words, the skin flap is too large to cover the side of the face without redundancy. The bigger the tumor the greater the excess of skin. So it comes about that by excising an appropriate amount of skin in an appropriate manner, the operator can effect a satisfactory 'facial lift,' suited exactly to the needs of the specific case.

The faciocervical skin flap is sutured accurately into place. Dependent corrugated rubber drainage is provided and a pressure dressing is applied to the facial part of the operation area.

RESULTS OF PAROTIDECTOMY

I have performed parotidectomy 76 times. [illegible] superficial lobectomy or total parotidectomy [illegible] been performed; in the re[illegible] resection of a tumor [illegible] superficial lobectomy or total [illegible]

1. For parotid tumor—44 cases.
2. For sialectasis*—6 cases.
3. For tuberculous parotid lymphadenitis with sinuses—2 cases.
4. For Boeck's sarcoid—1 case.

In 17 cases the tumor was a recurrent one, in one case it had recurred four times after various operative procedures, and in two cases it had recurred twice. A number of the patients had received radiotherapy without benefit.

Fig. 6. The original case of parotidectomy.

In six instances the patient had metastases in the neck; these were excised either at the time of the parotidectomy or at a separate session and in five of the six cases the invasion of the nodes by the tumor was confirmed histologically. In all these five patients further metastasis has occurred from which four of them have died. In the sixth, obviously enlarged lymphnodes were (unexpectedly reported upon as being inflammatory, and this patient who had combined total parotidectomy and excision of cervical lymphnodes is alive and well nine years later.

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* By sialectasis is meant dilatation of the parotid ducts, a condition that may be likened to bronchiectasis of the lung

The original case of superficial lobectomy was Mrs. E. R., aged 65, and the operation was performed in February 1937 (Fig 6) In 1948 she was admitted to a municipal hospital with carcinoma of the stomach and secondaries in the liver. She was seen a year previous to this, and she was well then and without any sign of a recurrence of the parotid tumor (Fig. 7).

Fig. 7. The same patient 10 years later

All the patients who have had superficial lobectomy or complete parotidectomy performed have been followed and with the exception of one who died accidentally, and those who had secondary deposits at the time of the operation, all (including the recurrent cases) have been traced and have remained cured of their neoplasm for various periods up to 10 years. In 80 percent of cases the report on the histologically variegated neoplasm can be summarized as 'mixed parotid tumor.' In a few instances the pathologist specifically stated that the tumor was a carcinoma. In three instances the tumor was pronounced to be an adenolymphoma.

As for the integrity of the seventh nerve, in two patients no attempt was made to preserve it, because in one patient the nerve had been already cut at a previous operation performed elsewhere, and on the other person the neoplasm (which proved to be an adenolymphoma) was so extensive and friable that the anatomy of the region was confused.

Over 40 percent of the remaining patients had temporary facial palsy lasting for various periods up to one year. Five of the above patients showed signs of facial muscular weakness after a year, but none of them were seriously inconvenienced. One patient has paralysis of the temporofacial division, but by a fortuitous coincidence she is the possessor of a glass eye on that side—the eye having been removed for an accident in childhood. This patient by reason of the glass eye, (although an intelligent woman) is not aware of the fact that she cannot approximate her left eyelid.

In two patients where the operation was performed less than a year ago, full recovery of the facial nerve is improbable. In one of these an immense tumor displaced the nerve medially at the stylomastoid foramen and although the branches are intact, the nerve may be damaged at its exit from the skull. However upon recent reexamination function of the nerve is definitely returning. The cervico facial division of the other patient entered a very large tumor which had been removed elsewhere a year previously, and I deliberately cut this division.

RIASSUNTO

La parotidectomia e' indicata nei tumori, nelle ectasie salivari congenite, nelle linfadeniti tubercolari del gruppo parotideo con formazione di seni e di fistole salivari altrimenti incurabili. L'operazione comprende la resezione extracapsulare, la lobectomia superficiale e l'asportazione complete della carotide. Una perfetta esposizione della ghiandola e' indispensabile. [illegible] iede la legatura della carotid [illegible] one di un esteso lem [illegible] ciale.

I tumori sono generalmente piu' estesi negli strati profondi che verso la superficie, mentre nel 30 percènto dei casi si riproducono dopo l'escisione.

Nella lobectomia superficiale il processo mastoideo viene reciso temporaneamente; il nervo facciale va seguito anteriormente fino alla sua biforcazione. I risultati finali si mantengono ottimi fino a che vengono rispettati il tronco principale, la divisione temporo-facciale e le diramazioni boccali: la recisione di altre branche non esercita un'influenza apprezzabile sui risultati.

SUMARIO

La parotidectomia es indicado en los tumores de la glandula parotida, en la sialectacia congenital de esta glandula, en la linfadenitis tuberculosa de la cadena linfatica de la region parotidea complicada con fistula salivaria intractable. En el tratamiento quirurjico se incluye la reseccion extra-capsular, la lobectomia superficial y la parotidectomia completa. La exposicion amplia de la glandula es indispensable y esto por lo tanto requiere la ligacion de la arteria carotida externa y la utilizacion de un pediculo de piel facio-cervical. Los tumores de la glandula son en general como 4/5 veces mas grandes en su region profunda que en su porcion superficial; y el 30% recurren despues de su reseccion.

En la lobectomia superficial el hueso mastoideo es temporalmente resectado y el nervio facial es disectado hasta el punto de subifurcacion. Si se conserva el tronco principal de este nervio asi como sus ramas temporo-facial, y bucales; la division de sus otras ramas no afectaran el resultado bueno de la operacion.

SOMMAIRE

La parotidectomie est indiquée dans les tumeurs de la parotide, dans la sialectasie congénitale de la parotide, dans la lymphadénite tuberculeuse des ganglions lymphatiques de la parotide avec sinus et fistules salivaires incontrolables. L'opération comprend la résection extracapsulaire, la lobectomie superficielle et l'enlèvement complet de la glande parotide. Pour exposer la glande complètement, il est indispensable de faire la ligature de l'artère carotide extérne et d'avoir recours à l'emploi d'un large lambeau cutané faciocervical. Les tumeurs sont généralement plus profondes à la surface inférieure qu'à la surface superficielle et dans 30% des cas il y a récidive après excision.

Dans la lobectomie superficielle, on fait une résection temporaire de l'apophyse mastoïde et on expose le nerf facial jusqu'à sa bifurcation. Tant que le tronc principal, la division temporofaciale et les branches buccales du nerf sont intacts, la division d'une ou deux des autres branches a peu d'influence sur les bons résultats obtenus par le traitement opératoire.

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Sympathetic Conduction Pathways Independent of Sympathetic Trunks—Their Surgical Implications

W F ALEXANDER, Ph D A KUNTZ M D, W P HENDERSON, B A
AND
E EHRLICH M S*
ST LOUIS MO

SURGERY involving the sympathetic nerves has been based on current concepts of the anatomy and the physiology of the autonomic nervous system According to these concepts, all sympathetic conduction pathways from the spinal cord to the effector organs traverse the sympathetic trunk All preganglionic fibers concerned in the sympathetic innervation of visceral organs including the blood vessels, sweat glands etc , emerge from the spinal cord through ventral spinal nerve roots

Current teaching illustrates that preganglionic fibers enter the sympathetic trunk through white communicating rami Most of them terminate in sympathetic trunk ganglia in synaptic contacts with ganglion cells Others pass through the sympathetic trunk, traverse the splanchnic nerves and end in sympathetic ganglia located in relation to the abdominal aorta and its branches or in more direct relation to visceral organs

Postganglionic fibers which arise in the sympathetic trunk ganglia and which are concerned in the innervation of peripheral blood vessels, sweat glands etc , join the spinal nerves through their sympathetic roots (gray communicating rami) Most postganglionic fibers of sympathetic trunk origin which are concerned in the sympathetic innervation of the head, the thoracic viscera etc , do not join spinal nerves but reach the effectors in question through sympathetic nerves which arise from the sympathetic trunks All sympathetic conduction pathways which conform to this general plan are interrupted by extirpation of the sympathetic trunk ganglia which they cross, or by section of the corresponding white communicating rami

Failure to achieve complete sympathetic denervation of the extremities either by extirpation of the appropriate segments of the sympathetic trunks or by section of the corresponding white communicating rami, has been observed many times Also failure to obtain complete sympathetic denervation of various other parts of the body has been reported Attempts to explain such failures in cases where faulty operative technic could be ruled out have involved consideration of anatomic variations and the possibility of restoration of interrupted conduction pathways

The anatomic variability of the sympathetic trunk ganglia and the rami connected with them has been emphasized particularly by Yaeger and Cowley [9] In a study of the lumbar portion of the sympathetic trunks in 19 human cadavers no two trunks were found similar, consequently no pattern of variation could be established Moreover the available data relative to differences in other portions of the sympathetic trunks indicate no basic patterns of variation

Small ganglia associated with communicating rami, primarily the gray rami, or sympathetic roots, have been described On the basis of an examination of fetal, infant and adult bodies, Gruss[1] concluded that such ganglia are limited to the lumbar region He observed a ganglion in a communicating ramus connected with the brachial plexus only in one body In four adult bodies, Wrete[8] found 2 to 14 ganglia associated with the communicating rami in the lumbar segments on one side Most of them were located in relation to sympathetic roots and a few were located adjacent to spinal nerves at the junctions of communicating rami

In dissections of five adult bodies Skoog[6] demonstrated small ganglia in the communicating rami of the cervical and the first thoracic spinal nerves In one instance small ganglia associated with the communicating rami of the second thoracic nerve were found. According to his observations the ganglia associated with the communicating rami were distributed with no definite pattern. Most of them were located in gray communicating rami, or sympathetic roots, and certain ones appeared to be associated with white communicating rami close to the sites of their origin from the spinal nerves.

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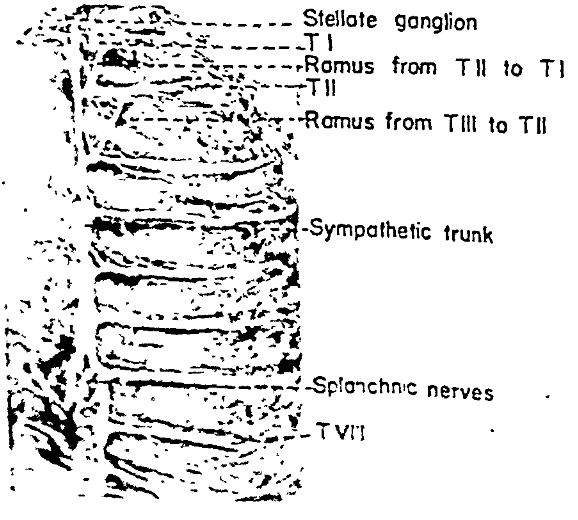
The present investigation includes detailed dissections of the sympathetic trunks and the communicating rami in human cadavers and microscopic examination of sections of communicating rami and of spinal nerves at the junctions of the communicating rami with them and particularly at the points at which the white communicating rami arise from the nerve roots. Some of the material prepared for microscopic study has been obtained at autopsy.

ANATOMIC AND HISTOLOGIC FINDINGS

The sympathetic trunks exhibit anatomic variations throughout their entire length. Those which occur in the upper thoracic and the lumbar segments are particularly significant in relation to sympathectomy. In the presence of a well developed stellate ganglion, the first thoracic segment frequently includes no grossly recognizable ganglion. Variations in the communicating rami in the upper thoracic segments often are associated with variations in the sympathetic trunk ganglia. In a high percentage of cases the second thoracic nerve gives rise near the origin of its white communicating ramus, to a ramus which joins the first. In a somewhat lesser percentage of cases the third thoracic nerve gives rise to a similar ramus which joins the second (Fig. 1).

These interconnecting rami constitute a pathway through which sympathetic postganglionic fibers, which arise in the sympathetic trunk ganglia in the second and the third or lower thoracic segments, may reach the brachial plexus without traversing the upper thoracic segments of the sympathetic trunk (Kuntz[3]; Kirgis and Kuntz[2]).



[illegible] dissection showing tho- [illegible] trunk and communicating [illegible]

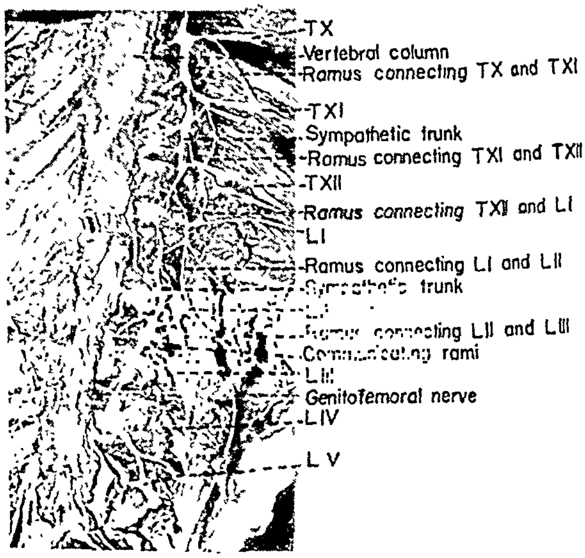

TX
Vertebral column
Ramus connecting TX and TXI
TXI
Sympathetic trunk
Ramus connecting TXI and TXII
TXII
Ramus connecting TXII and LI
LI
Ramus connecting LI and LII
Sympathetic trunk
LII
Ramus connecting LII and LIII
Communicating rami
LIII
Genitofemoral nerve
LIV
L V

Fig. 2. Photograph of human dissection showing lower thoracic and lumbar nerves, conecting rami, sympathetic trunk and communicating rami, psoas muscle removed.

In the lumbar region the sympathetic trunk ganglia vary within a wide range both with respect to number and to position with reference to the vertebrae. Often there is no recognizable ganglion at the level of the first lumbar vertebra. The most constant one on both sides lies adjacent to the second lumbar vertebra but not always at the same level, and in some instances it extends onto the body of the third lumbar vertebra. This is in agreement with the findings of Yaeger and Cowley[9] The rami connected with the individual sympathetic trunk ganglia differ in numbers and with respect to their course direction. Some take transverse paths; some join the ganglion from a higher level; some join the ganglion from a lower level. Therefore most of them take oblique courses (Fig. 2)

Viewing the sympathetic trunks and the lumbar spinal nerves from the ventral aspect (after the psoas muscle has been completely removed) the sympathetic roots, or gray communicating rami, lie somewhat deeper than the white communicating rami There is at least one sympathetic root for every spinal nerve. In the lumbar segments these roots are located in relation to the lumbar arteries In some instances a sympathetic root divides into two rami which curve around the artery and reunite to form a single ramus which continues dorsad to join the spinal nerve medial to the origin of an oblique ramus. As Wrete observed, ganglia associated with communicating rami or with sympathetic roots may occur in all the lumbar segments.

In the present study, ganglion cell aggregates have been observed outside the sympathetic trunk ganglia in the cervical region, the first and the second thoracic, and the upper three lumbar segments Only those which were imbedded in ventral nerve roots or which were located adjacent to ventral nerve roots have been studied in detail. They were usually located at or near the site of origin of a white communicating ramus. In a few instances such a ganglion could be detected mascroscopically. Most of them could be observed only in histologic sections.

In the thoracic region ganglia imbedded in a ventral nerve root or lying adjacent to it have been observed only in the first and in the second thoracic segments In some instances a ganglion located at the site of origin of the visceral ramus of this nerve could be detected mascroscopically. In sections of such a ganglion taken parallel to the axis of the nerve, the ganglion cells appear to be closely aggregated, forming a compact mass lying in intimate contact with the ventral nerve root (Fig. 3A).

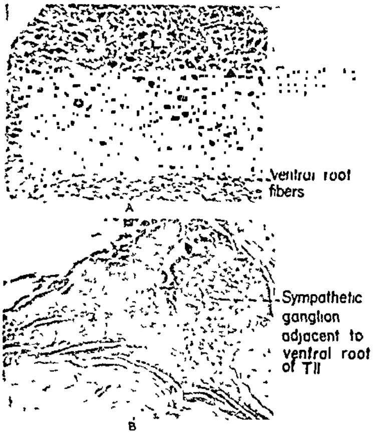


Fig. 3 A. Photomicrograph from a section of a sympathetic ganglion located adjacent to the ventral root of the second thoracic nerve B. Photomicrograph (low magnification) of a section of the same ganglion, showing the entire section of the ganglion and its relation to ventral root fibers.

In one of these ganglia associated with the second thoracic nerve the number of ganglion cells, as indicated by cell counts, was found to be in excess of 20,000. Ventral root fibers could be traced directly into the ganglion. Also fibers which emerged from it, could be traced distalward in the nerve trunk (Fig. 3B). In this instance the second thoracic nerve undoubtedly included many sympathetic conduction pathways which did not traverse the sympathetic trunk, but which included synaptic connections in the ganglion associated with the ventral nerve root. Sympathetic pathways in the second thoracic nerve which are independent of the sympathetic trunk, (like those which traverse the sympathetic trunk) may lead into the brachial plexus through the ramus of this nerve which joins the first thoracic (Fig. 1). Similar direct sympathetic pathways in the first thoracic nerve may lead directly into the brachial plexus.

In the lumbar region sympathetic ganglia associated with the ventral spinal nerve roots have been observed only in the first and the second lumbar segments. Most of them were small and could be observed only in sections. Just a few were large enough to be detected macroscopically. Some of the small ganglia were imbedded in the ventral nerve root usually near the site of origin of the white communicating ramus (Fig. 4), and some were located in the proximal portion of the white communicating ramus. In a number of instances a small ganglion was found imbedded in the ventral nerve root and a somewhat larger one was discovered located adjacent to the ventral root at the site of origin of the white communicating ramus.

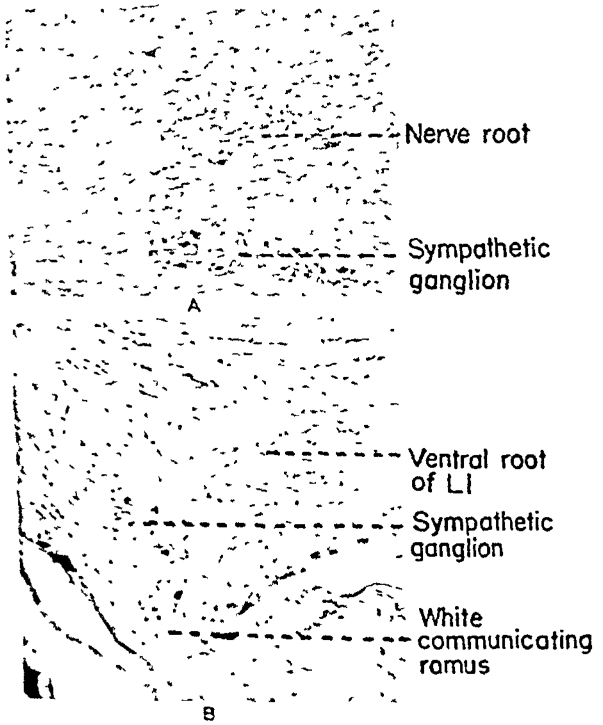


Fig. 4. A. Photomicrograph showing a small sympathetic ganglion imbedded in the ventral root of the [illegible] lumbar nerve. B. Photomicrograph showing a small sympathetic ganglion imbedded in the ventral root of the second lumbar nerve at the origin of the white communicating ramus.

Ganglion cell counts, in a limited number of [illegible] ganglia imbedded in the ventral roots of the first and the second lumbar nerves, [illegible] range of variation in numbers [illegible] 160 to over 2,000. The [illegible] to the ventral nerve roots on the average were larger than those which were imbedded in the nerve roots. The largest ones were comparable in size to the largest ones observed in the first and the second thoracic segments.

In longitudinal sections of a lumbar nerve with a sympathetic ganglion imbedded in its ventral root, fibers may be traced into the ganglion from the proximal side. Fibers may also be traced distalward from the ganglion in the nerve trunk. These relationships favor the assumption that the ganglion cells are synaptically connected with preganglionic fibers which reach them directly via the ventral nerve root and in turn send their axons distalward in the nerve trunk. The axons of most of the ganglion cells located adjacent to a ventral nerve root seem to extend distalward in the nerve trunk. Most of the conduction pathways of which ganglion cells are imbedded in the nerve root or which are located adjacent to it constitute the distal links and are independent of the sympathetic trunk. The possibility that the axons of some ganglion cells, which are associated with a ventral nerve root, extend into the sympathetic trunk through the white communicating ramus is not precluded. Such fibers would traverse the sympathetic trunk and emerge in sympathetic roots.

In the lower thoracic and the upper lumbar segments, as in the upper thoracic segments, rami which interconnect adjacent spinal nerves convey both sympathetic and somatic fibers. From the eleventh thoracic nerve a slender ramus which arises near the communicating ramus may be traced to its junction with the twelfth thoracic nerve near the origin of a communicating ramus. Similar rami connect the twelfth thoracic and the first lumbar, the first and the second lumbar and the second and the third lumbar nerves (Fig. 2). These rami constitute pathways through which both sympathetic and somatic nerve fibers extend from one segmental nerve into an adjacent one. Those rami which connect the eleventh thoracic nerve with the twelfth, and the twelfth thoracic nerve with the first lumbar, may convey postganglionic sympathetic fibers from the lower thoracic into the upper lumbar segments. The presence of some intact sympathetic conduction pathways in the upper lumbar nerves following extirpation of the upper lumbar segments of the sympathetic trunk, leaving the thoracic segments intact, could be accounted for on this basis.

Rami connected with the first and the second lumbar nerves may transmit postganglionic fibers from the ganglia located in the ventral roots or at the points of origin of the white communicating rami of these nerves, when such ganglia are present, as well as fibers which arise in sympathetic trunk ganglia and reach these nerves through sympathetic roots. Nerves which have no ganglion cell aggregates associated with their ventral roots may include sympathetic conduction pathways which do not traverse the sympathetic trunk.

COMMENT

Sympathetic ganglion cells imbedded in ventral spinal nerve roots or located adjacent to nerve roots in relation to white communicating rami, undoubtedly represent cells which in their displacement from the neural tube, failed to reach the primordia of the sympathetic trunk ganglia. Those cells located in gray communicating rami, or sympathetic roots, are representative of those which have been displaced from the primordia of sympathetic trunk ganglia. The synaptic connections of ganglion cells located in relation to spinal nerve roots, or associated with the communicating rami must be determined primarily by their anatomic relationships. Those which are located in gray communicating rami, or sympathetic roots, undoubtedly are synaptically related to preganglionic fibers traversing the sympathetic trunk ganglion from which arises the gray ramus in question. Their axons join the spinal nerve with those in the same ramus which arise in the sympathetic trunk ganglion and have a similar distribution. Extirpation of the sympathetic trunk ganglion, consequently, would interrupt the conduction pathways of which they represent the peripheral links.

Ganglion cells which are located in a white communicating ramus are probably synaptically connected with preganglionic fibers which traverse the ramus to the points at which the ganglion cells are located. These preganglionic fibers may or may not extend into the sympathetic trunk. The axons of ganglion cells situated in a white communicating ramus may traverse the sympathetic trunk, or they may join the spinal nerve through the proximal portion of the white ramus and extend peripheralward in the nerve trunk. Ganglion cells, located in a ventral spinal nerve root or in close proximity to it, appear to be synaptically connected with preganglionic fibers which reach them directly through the ventral nerve root. Their axons do not traverse the sympathetic trunk but extend distalward in the spinal nerve (Fig 5). The conduction pathways of which they constitute the peripheral links would not be interrupted by extirpation of the sympathetic trunk.

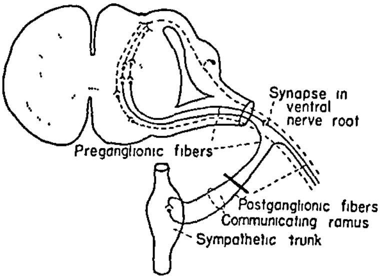


Fig 5 Diagram to illustrate a sympathetic conduction pathway with synapse in a sympathetic trunk ganglion and one which is independent of the sympathetic trunk with synapse in the ventral nerve root.

The anatomic data outlined above demonstrate the existence in the first and the second thoracic and the first and the second lumbar nerves, in some human bodies, of sympathetic conduction pathways which are independent of the sympathetic trunk. They do not preclude the occurrence of such pathways in other spinal nerves. The functional significance of sympathetic pathways which do not traverse the sympathetic trunk and the frequency with which they occur is indicated by the number of failures to abolish sympathetic nerve activity in the corresponding areas of innervation by sympathetic ganglionectomy or section of the corresponding white communicating rami.

In a study of 140 patients, all of which had been subjected to extirpation of the lower thoracic and the upper lumbar segments of the sympathetic trunk or the upper lumbar segments alone, Ray and Console[5] demonstrated sympathetic nerve activity in the twelfth thoracic and the upper three lumbar dermatomes. Most of the patients had the sympathetic trunk removed from the eighth thoracic to the third lumbar segment. In 14 instances the entire sympathetic trunk had been removed, except in certain cases in which the sixth and the seventh thoracic ganglia were left in place for technical reasons. Some patients, particularly among those with extensive sympathectomy, gave evidence of residual sympathetic activity in cutaneous areas not included in the twelfth thoracic and the upper three lumbar dermatomes. In most of the individuals bursts of sympathetic activity could be demonstrated in the denervated area immediately after operation. Many showed no evidence of sympathetic activity immediately after sympathectomy in the areas affected, but sympathetic activity could be demonstrated after a few days or a few weeks.

On the basis of their findings, Ray and Console concluded that residual sympathetic pathways to the lower extremities remain intact following sympathetic trunk extirpation regardless of the extent of the excision. They did not demonstrate the anatomic relationships of these pathways, but pointed out that the residual sympathetic activity could be abolished by section of the ventral nerve roots, spinal anesthesia or paravertebral nerve blocking.

Intact sympathetic pathways following sympathetic trunk extirpation apparently are not limited to peripheral areas. On the basis of extensive experience with thoracolumbar sympathectomy for the relief of hypertension, Poppen and Lemmon[4] concluded that this procedure does not result in complete vasomotor denervation of the splanchnic area in most patients, even though the sympathetic trunks are removed from the third thoracic to the third lumbar segment.

The [illegible] demonstration of sympathetic [illegible] pathways, which are independent [illegible] trunk, affords a more satis[illegible] than formerly has been possible. For most failures to achieve complete sympathetic denervation in the affected areas by sympathectomy have been in cases where faulty operative technic can be ruled out. Sympathetic pathways involving synaptic connections in ventral nerve roots or in ganglia associated with the nerve roots do not traverse the sympathetic trunk, and are not interrupted either by sympathetic trunk extirpation or by preganglionic sympathectomy. These operations usually are undertaken and are interrupted by section of the corresponding ventral nerve roots. Resection of the ventral roots of the second and the third thoracic nerves, in conjunction with resection of the white communicating ramus of the first thoracic nerve and interruption of the sympathetic trunk below its connections with the third thoracic nerve, probably would guarantee complete sympathetic denervation of the upper extremity in some cases. To insure permanence of this result would require additional measures to prevent restoration of the interrupted conduction pathways by regeneration of the severed ventral root fibers.

Smithwick[7] described an operative procedure in which both roots of the second and the third thoracic nerves were divided and a segment of each nerve was removed—including the junctions of the communicating rami with the nerve. This procedure not only interrupts all the preganglionic fibers in the second and the third thoracic segments, but also removes the ganglion cells associated with the ventral roots of these nerves. Probably it would effectively prevent restoration of all pathways which include preganglionic fibers of the second and the third thoracic nerves.

Cases in which there is a ganglion associated with the ventral root of the first thoracic nerve, present a more difficult problem since section of this nerve would result in extensive motor paralysis. The residual sympathetic activity in the twelfth thoracic and the upper three lumbar dermatomes following sympathetic trunk extirpation, as pointed out by Ray and Console,[5] can be abolished by section of the ventral nerve roots, spinal anesthesia or paravertebral nerve blocking. Ganglion cells concerned in the direct sympathetic pathways in the lumbar region appear mainly in the first and second lumbar segments; in the ventral roots of the first and second lumbar nerves, in addition to extirpation of the lower two thoracic and upper two lumbar segments of the sympathetic trunk and in most cases insures complete sympathetic denervation of the lower extremity.

Ventral root section in the lumbar region must be regarded as a drastic procedure even though the resulting limited motor paralysis is of little consequence. Measures also would be necessary to prevent regeneration of the divided ventral root fibers.

SUMMARY

Small ganglia located in communicating rami have been previously reported. Aggregates of sympathetic ganglion cells also lie imbedded in ventral spinal nerve roots and adjacent to nerve roots at the sites of origin of white communicating rami. These ganglion cells are synaptically connected with preganglionic fibers which reach them directly via the ventral nerve root. Most of them in turn send their axons distalward in the nerve trunk. In this manner sympathetic conduction pathways are formed which do not traverse the sympathetic trunk. They are not interrupted by sympathetic trunk extirpation or by section of the white communicating rami.

Ganglia in the ventral nerve root or located adjacent to the root have been observed mainly in the first and the second thoracic and the first and the second lumbar segments. Due to connecting rami between the upper thoracic nerves and between the eleventh thoracic to the third lumbar nerves, the distribution of the sympathetic conduction pathways which are independent of the sympathetic trunk is not limited to the segments in which the ganglion cells concerned are located.

Resection of the ventral roots of the second and the third thoracic nerves, in conjunction with resection of the white communicating ramus of the first thoracic nerve and interruption of the sympathetic trunk below its connections with the third thoracic nerve probably would insure complete sympathetic denervation of the upper extremity in some cases. Resection of the ventral roots of the first and the second lumbar nerves in conjunction with extirpation of the sympathetic trunk from the eleventh thoracic to the third lumbar segments probably would insure complete sympathetic denervation of the lower extremity. In order to achieve permanent sympathetic denervation measures to prevent regeneration of the interrupted ventral root fibers would be necessary.

RIASSUNTO

L'A. ha precedentemente individuato dei piccoli gangli situati nei rami comunicanti. Accumuli di cellule ganglionari del simpatico sono stati ritrovati pure innicchiati nelle radici ventrali del midollo spinale ed in vicinanza alle radici nervose nei punti di origine dei rami comunicanti bianchi. Queste cellule ganglionari sono connesse per sinapsi con le fibre preganglioniche che le raggiungono direttamente attraverso le radici nervose ventrali. La maggioranza di queste cellule emettono a loro volta distalmente dei cilindrassi nei tronchi nervosi; in questo modo si creano delle vie di comunicazione simpatiche che non attraversano i tronchi del simpatico. Non vengono percio' interrotte con l'estirpazione dei tronchi simpatici o con la resezione dei rami comunicanti bianchi.

Gangli simpatici nelle radici nervose ventrali o in prossimita' delle radici stesse sono stati ritrovati principalmente nel primo e secondo segmento toracico e nel primo—secondo segmento lombare. Data l'esistenza di rami comunicanti tra i nervi toracici superiori a fra l'11° toracico ed il 3° nervo lombare, la distribuzione delle vie di conduzione del simpatico indipendenti dai tronchi del simpatico stesso non e' limitata ai segmenti nei quali le cellule ganglionari relative sono localizzate. Una completa simpatectomia degli arti superiori potrebbe essere raggiunta in taluni casi mediante la resezione delle radici ventrali del 2° e del 3° nervo toracico, in combinazione con la resezione del ramo comunicante bianco del 1° nervo toracico e l'interruzione del tronco simpatico al disotto delle sue connessioni con il 3° nervo toracico.

Una completa simpatectomia degli arti inferiori potrebbe essere invece raggiunta mediante resezione delle radici ventrali del 1° e del 2° nervo lombare, in combinazione con l'estirpazione del tronco sompatico dall'11° segmento toracico al 3° segmento lombare.

Per ottenere una completa e permanente denervazione simpatica degli arti occorrerebbe pero' istituire delle misure atte a prevenire una rigenerazione delle fibre nervose interrotte nelle radici ventrali.

SUMARIO

Hemos reportado en un articulo previo la presencia de pequenos ganglios en el curso de ciertas rami aferentes del gran simpatico. Estas pequenas colecciones de celulas ganglionarias se han encontrado tambien en la substancia de las raices motoras de ciertos nervios espinales o adyacentes a estas raices en el punto de origen de sus rami aferentes. Por el intermedio de estas neuronas ganglionarias existen connecciones entre el sistema nervioso central y la periferia que son independientes del tronco ganglionar del gran simpatico y que por lo tanto ne se destruyen con la reseccion de este tronco o de sus rami aferentes.

Los ganglios de las raices motoras o en su vecindad han sido observados principalmente en las raices correspondientes al primero y undo segmento toracico y primero y segun gmento lumbar. La existencia de rami unicantes entre los primeros nervios cicos y entre el onceavo toracico y los tres rimeros lumbares aumentan considerablemente la distribucion de estas conecciones simpaticas independientes del tronco ganglionar del gran simpatico.

La reseccion de las raices motoras del segundo y tercero nervio toracico y de la rama aferente communicante de este ultimo nervio en conjuncion con la interrupcion del tronco del gran simpatico en su nivel inferior al punto de origen de su rama afarente communicante con el tercer segmento toracico aseguran en ciertos casos la denervacion completa de las connecciones simpateticas del miembro superior correspondiente.

La reseccion de las raices anteriores de los primeros dos nervios lumbares en conjuncion con la extirpacion completa del tronco del gran simpatico en sus segmentos correspondientes a los ultimos dos toracicos y tres primeros lumbares aseguraran la denervacion completa de las connecciones simpateticas del miembro inferior correspondiente. En orden de obtener permanente la denervacion completa de todas las connecciones simpateticas de una region dada es necesario el usar ciertas medidas que prevengan la regeneracion de las raices que han sido interrumpidas.

SOMMAIRE

Les petits ganglions situés dans les ramaux communiquants sont connus. Les collections de cellules de ganglion sympathique se rencentrent dans les racines des nerfs spinaux ventraux et sont aussi adjacentes aux racines des nerfs à l'origine des ramaux communiquants blancs. Ces cellules ganglionnaires sont jointes par synapse à des fibres préganglioniques qui arrivent à elles directement par les racines ventrales des nerfs. La plupart envoient leurs axons par la périphérie par l'intermédeaire de tronc nerveux. De cette manière, des passages de conduite sympathiques sont formés qui ne traversent pas le tronc sympathique. Ils ne sont pas interrompus par l'extirpation du tronc sympathique ou par la section des ramaux communiquants blancs.

Les ganglions dans les racines ventrales du nerf ou situés proche de ces racines, ont été observés principalement dans le premier et second segments thoraciques et dans le premier et second segments lombaires. La distribution des conduits sympathiques qui sont indépendants du tronc sympathique, n'est pas limitée aux segments dans lequels les cellules ganglionnaires intéressées sont situées.

La résection des racines ventrales du second et troisième nerfs thoraciques, employée avec la résection des ramaux communiquants blancs du premier nerf thoracique et l'interruption du tronc sympathique après ses connections avec le troisième nerf thoracique, probablement assureraient une complète dénervation sympathique de l'extrémité supérieure dans beaucoup de cas. La résection des racines ventrales du premier et du second nerfs lombaires en conjonction avec l'extirpation du tronc sympathique allant du 11eme au 3eme segments lombaires, probablement assurerait une complète dénervation sympathique de l'extrêmité inférieure. Pour obtenir une dénervation permanente du sympathique, il serait nécessaire d'empêcher la régénération des fibres de la racine ventrale interrompre.

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Two Stage Pharyngo-Esophageal Diverticulectomy

Indications and Technic

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AND
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IN A PREVIOUS paper we described a method for handling pharyngo-esophageal diverticula by an original one stage operation. There are, however, certain diverticula of this region which do not lend themselves to this operation; and there are certain patients who, by reason of their poor reparative powers and general debility, are unsuited to an operation which requires excellent reparative powers and a good nutritional state to insure a low morbidity and mortality.

The size, arrangement, and condition of the diverticulum may indicate the need for performing a special two stage operation. When a large diverticulum distorts the structure from which it takes origin, it may interfere with the passage of a Levin tube into the stomach and make it impossible to feed the patient by gavage. In some instances, the distortion is so great, that almost everything the patient eats passes immediately into the diverticulum because the latter opening is in a more favorable position and is larger than that of the esophageal lumen which may be compressed by the distended sac (Fig. 1).

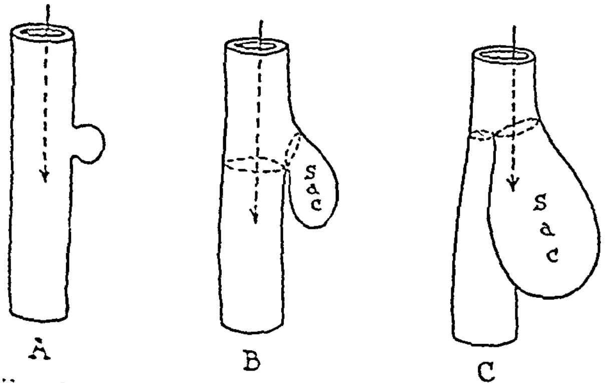

Fig. 1. Three stages in the development of a large pharyngo-esophageal diverticulum.

These large diverticula may even make it more difficult to design excision and closure so that accurate apposition can be obtained without distortion or stricture formation.

We also select for two stage operations those diverticula complicated by inflammation, ulceration and perforation. Not only do we prefer to do a two-stage procedure in these instances, but we believe that a one-stage diverticulectomy is contraindicated.

In the first stage of the two-stage operation for pharyngo-esophageal diverticulum, the sac is freed, brought out laterally and a diverticulopexy done. We employ silk sutures to keep the fundus of the diverticulum suspended high in the neck so that the fundus is on a higher level than the cricoid cartilage. The fundus of the sac is sewn to the deep cervical fascia anterior to the sternocleidomastoid muscle. This insures adequate emptying because the neck of the sac will be at a lower level than the fundus. To avoid fistula formation and serious infection, the silk sutures are inserted only in the submucosa of the sac. In one instance we observed a patient who developed an anaerobic infection caused by organisms carried by sutures which penetrated the mucosa of the sac. The infection spread in the tissues of the neck and face. The condition was ultimately brought under control but the patient's convalescence was considerably delayed.

To encourage the formation of a limiting plastic wall about the neck of the sac, we have found a small iodoform packing very useful. This packing is placed along the inferior margin of the diverticulum and extends from the lateral edge of the esophagus to the skin edges where it is brought out and transfixed with a small safety pin (Fig. 2). This packing is left in place for about five days. Along the line of the packing, adhesions are formed between the sac and the surrounding structures These adhesions, along with the anchoring sutures, prevent the sac from descending into its original position If it has been impossible before fixation of the sac in the neck to pass a Levin tube down the esophagus, it can now be done in practically every instance

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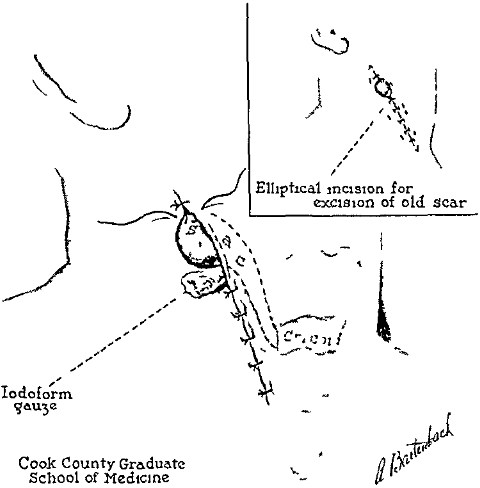
Elliptical incision for excision of old scar
S
a
c
Cricoid
Iodoform gauze
Cook County Graduate School of Medicine
A Bartenbach

Fig 2 The position of the diverticulum in the neck after it has been anchored in the upper angle of the incision A stitch is shown transfixing the submucosa of the fundus of the sac Dotted line illustrates excision of old scar at beginning of second stage of operation

After a period of two or more weeks, if *the patient's nutritional balance has been restored* and his physical condition warrants it, the second stage of the operation may be undertaken While it is true that most diverticula can be resected within the first month following their suspension in the neck, we have had patients who have gone as long as one year before they found it convenient to return for the second stage of the operation The following case will serve to illustrate this point

CASE REPORT

I J , age 79, farmer, and father of a professional colleague He was first admitted to Wesley Memorial hospital, August 3, 1937 He said that for 10 years he had been conscious of increasing difficulty in swallowing He lived on a farm rather remote from medical service and it was not until loss of weight and weakness handicapped him in his work that he decided to consult his son about his ailment He stated that when he began to eat he felt all right but after a few minutes, there was a progressively increasing discomfort which terminated in complete inability to swallow more liquid or solid food When this stage was reached, he massaged his neck and was able to evacuate a rather large quantity of food into the mouth, which he immediately removed

When the patient presented himself at the hospital, he had already lost 20 pounds and was so weak he could barely stand alone It was of special interest to learn that the patient's father had died from starvation because of a 'similar' condition. The advanced age of the patient and the fact that he was on the point of collapse from starvation led us to adopt a conservative procedure. The following day, after a preliminary injection of morphine sulphate gr. 1/6 and scopolamine gr. 1/150, the right side of the neck was infiltrated with one percent novocaine. An incision was made along the anterior border of the sternocleidomastoid muscle, about one inch above and one and one-half inches below the level of the cricoid. The sac was brought into the field, and a strip of iodoform gauze was inserted along the inferior surface of the sac. The entire sac was lifted up above the level of the cricoid cartilage to minimize the possibility of its being filled with material which he subsequently took by mouth. The protruding portion of the sac shrank rather rapidly and the wound healed after the iodoform gauze was removed on the fourth day. In this particular instance, no stitches were placed in the fundus of the sac to fix it in the wound.

On the evening following the operation the patient sat up in a chair and was permitted to swallow some sweetened tea. During his stay in the hospital, he was able to take a gradually increasing amount of fluid. When he left the hospital fifteen days later, he was eating liberal quantities of soft food without distress.

For eight months the patient continued to gain weight and strength. Toward the end of this time he experienced a recurrence of difficulty in swallowing, and though it was not as marked as formerly, it annoyed him. Since he had now gained more than his original weight loss, it was considered advisable for him to return to the hospital for a check-up. X-ray examination showed that the sac had gradually retracted back into the neck, but had not assumed the proportions showed before the first operation.

On June 23, 1938, he was readmitted to the hospital and the following day the old scar was excised under local anesthesia. The diverticulum was dissected out and the opening in the esophagus sutured with fine black silk. The wound was left open with no drain and no sutures. Recovery was uneventful and he was discharged in excellent condition. A recent examination of the patient showed no remnant of his diverticulum.

When heard from on March 8, 1946, he reported that he was in excellent health and had no difficulty in swallowing. He is now 87 years old.

It is surprising how greatly large diverticula will shrink when they are fixed in the neck and are no longer subject to distention by swallowed food and fluids. The method we employ in the second stage of the operation is identical with the original one stage pharyngoesophageal diverticulectomy previously described by us.

METHOD

1. The old scar is excised with an elliptical incision, being careful not to cut into the fundus of the diverticulum (Fig. 2).

2. The fascia along the anterior border of the muscle is divided and the muscle retracted laterally exposing the carotid sheath.

3. The lateral border of the thyroid gland is exposed and its margin clearly defined.

4. The carotid sheath, its vessels and nerve, are retracted laterally by a ribbon retractor. The thyroid gland and its underlying larynx and trachea are retracted medialward (Fig. 3B).

5. The loose areolar tissue between thyroid and the carotid sheath supports the inferior thyroid artery which usually should be ligated and divided (Fig. 3B).

6. If the lateral margin of the esophagus is now identified, the position of the diverticulum can be established by remembering that its neck is at the level of the cricoid cartilage and its fundus extends downward between the posterior wall of the esophagus and the anterior surface of the prevertebral fascia (Fig. 3).

7. Careful traction on the wall of the diverticulum with a Babcock (or similar non-traumatizing forceps) will bring the sac into the more superficial regions of the incision where its size and conformation can be clearly studied.

8. The neck of the sac now is clearly exposed and by lifting gently it will be found that it is possible to rotate the pharyngoesophageal area into direct vision. The extent of the rotation of the esophagus and trachea around the longitudinal axis of these structures has been studied in the living and fresh postmortem specimens. It is found that with moderate tension this rotation amounts to between 45 and 90 degrees. The maneuver will bring the neck of the sac into a completely visible and accessible position. The recurrent laryngeal nerves are not rendered more vulnerable by this rotation; on the contrary this maneuver permits a better view of the proximal nerve and the distal one is

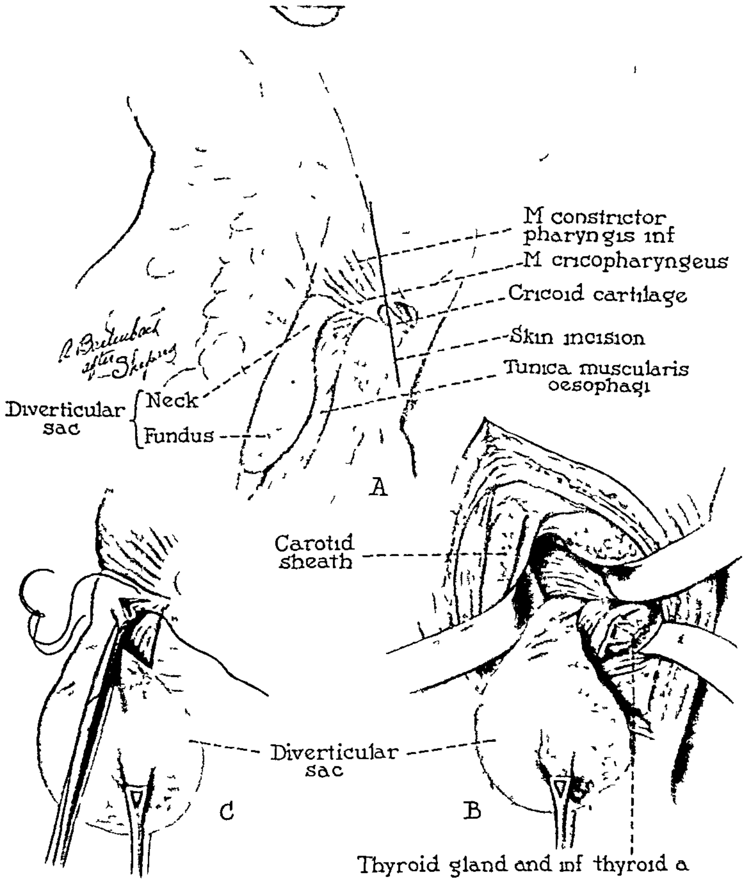

Fig 3 Position of sac and its relation to neighboring structures

not drawn into the field of danger (Fig 4A, B)

9 The muscle fibers of the boundaries of the neck of the diverticulum are now clearly separated from the sac wall with maneuvers which will preserve as many of them as possible because they can be utilized subsequently to reinforce the suture line of the repaired defect

10 It is important that the proximity of the inferior recurrent laryngeal nerves be kept in mind (Fig 5A, B, C)

11. After a careful survey of the neck of the sac a point is selected at its lateral margin on a level with the cricoid cartilage and a fine forceps is applied transversely. A knife is used to divide the tissue proximal to the jaws of the forceps. This will make the initial opening into the esophagus (Fig. 5A). This opening is now sutured with one or more interrupted fine silk sutures. A second forceps is now applied just beyond the first forceps, being sure to continue at the same level and to maintain the same transverse character of the division. As subsequent forceps are applied and the tissue divided proximally to them, the opening in the esophagus is sutured by carefully spaced interrupted sutures until the entire diverticulum has been severed from the pharyngo-esophageal junction.

This rather methodical clamping, division, and suturing, results in a secure closure of the defect in the esophagus without the danger of undue narrowing and constriction and without leaving crushed and devitalized tissue in the grasp of the sutures. The well-spaced interrupted sutures bring the mucosa into intimate apposition and secure the holding submucosal layer against separation by their distribution of the tension evenly across the posterior wall of the viscus. The diverticulum has been detached from its base in a transverse diameter so that postoperative stricture formation is greatly lessened (Fig. 5).

12. The muscle fibers of the cricopharyngeus and the uppermost fibers of the esophagus are now drawn over the first suture line with interrupted sutures (Fig. 5A).

13. A small soft rubber drain may be inserted down to the lateral margin of the thyroid gland to provide a pathway along which blood or serum may escape. It will likewise form a pathway of easy exitus for any leakage, should it occur. *In no instance should the wick be carried down to the immediate vicinity of the suture line where it would inhibit the reparative processes by carrying away the plastic exudate from the suture line.*

POSTOPERATIVE CARE

If a Levin tube could be passed before the first stage of the operation, it has been our practice to leave it in place after the diverticulopexy. This is useful in poorly nourished debilitated patients and offers a means for immediate introduction of fluids into the stomach. If any considerable difficulty is encountered in the introduction of the Levin tube, it has been found that the patients can usually swallow enough food to sustain themselves; and most of them will improve their nutritional state rapidly. It is an advantage

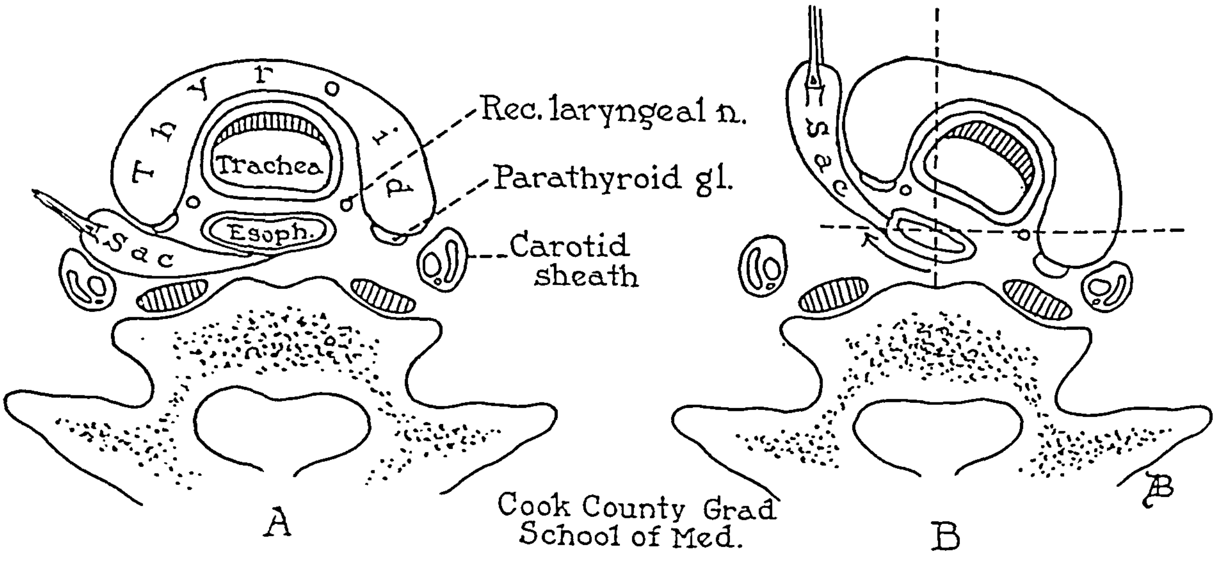

Fig. 4. The mobility of esophagus and diverticulum is diagrammatically illustrated.

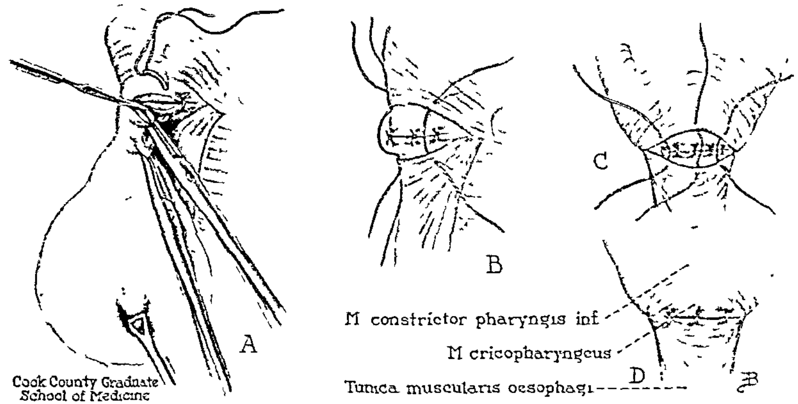
A
B
C
D
M constrictor pharyngis inf
M cricopharyngeus
Tunica muscularis oesophagi
Cook County Graduate School of Medicine

Fig. 5. This drawing shows: A. Method of transverse division of sac and application of interrupted sutures. B, C, and D illustrate the completed suturing of the transverse division of the neck of the diverticulum; reinforcing sutures through the muscle fibers of cricopharyngeus and muscle fibers of esophagus are also shown

to have a Levin tube in the stomach before the second stage of the operation is done. Feeding following the first stage can be pushed as rapidly as the patient can manage. After the second stage of the operation, all food and fluids by mouth should be withheld for at least eight to 10 days. During this interval, the patient is supported by daily administration of glucose and salt solution and in some instances supplemented by amino acids, plasma, and whole blood transfusions.

The use of vitamins is exceedingly helpful in restoring the patient's resistance and reparative powers. Vitamin C is given in 1000 mgm. dose daily. This amount is introduced slowly along with the glucose and salt solutions. Vitamin B complex is also given in the infusions. In patients who show any evidence of prolonged bleeding time we have routinely administered Vitamin K in doses of 10 mgm. by hypodermic and 5 mgm. every other day until the prothrombin time is within normal range. At the end of the eight to 10 days the Levin tube is removed and the patient is started on our regular postoperative gastro-intestinal diet, which is as follows:

10th and 11th Postoperative Day:

15 feedings, 1 oz. maximum q. hourly.

- a) Hot water and tea in teaspoonful amounts and if tolerated increased to 1 oz. q. hourly.
- b) Sugar sweetened tea; cooked fruit juice; milk-mixture.

12th to 16th Postoperative Day:

15 feedings, 2 oz. maximum q. hourly.

- a) To above foods may be added 2 egg whites.
- b) *Later, 1 egg daily; soft boiled, poached* or coddled.
- c) Cereal (cooked).
- d) Add another egg—on 15th and 16th day (2 daily).

16th to 20th Postoperative Day:

8 feedings, 4 oz. maximum q. 2 hours

- a) *Add another egg (now 3 daily)* may be served as omelet or creamed.
- b) Beverages.
- c) Another serving of cooked cereal daily.
- d) Ice cream, custard, and jello may be substituted for milk or milk-mixture.

After the first 10 days of the gastrointestinal diet, highly concentrated and nutritious soft foods are permitted. The patient is encouraged to swallow small amounts and eat slowly.

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SUMARIO

Se presentan las indicaciones y la tecnica dos etapas de la diverticulectomia faringo-esofagica. Se presenta en detalle, el tratamiento pre y post-operatorio. Es nuestra opinion la alimentacion por via oral muy tempranamente es la causa mascomun en la produccion de la fistula post-operatoria; esta se puede evitar si se toma ventaja de los numerosos metodos injeniosos a disposicion del cirujano que existen hoy en dia en la alimentacion paciente por las diferentes vias parenterales.

En nuestra experiencia nunca ha sido necesaria la dilatacion del esofago subsecuente la diverticulectomia y atribuimos esto a varios factores, pero principalmente a la reseccion transversal, al uso de suturas interrumpidas atraumaticas, y al cuidado que tomamos de no traumatizar los tejidos.

SOMMAIRE

Les indications et la technique de la diverticulestomie pharyngoeosophagéalle en deux temps sont discutées.

Les soins préopératoires et postopératoires
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Labyrinthine Surgery for Ménière's Disease

J R LINDSAY M D, F I C S*
CHICAGO ILL

MÉNIÈRE'S disease is characterized by recurring attacks of vertigo along with auditory symptoms of a distinctive type The inner ear pathology which causes these disturbances, is now known to be a hydrops of the labyrinth The type of hydrops found in this condition differs essentially from that commonly found in inflammatory inner ear disease but the etiology is indefinite and therefore it is called ' idiopathic hydrops" The most favored theory as to the etiology is—a disturbance in the secretory apparatus leads to oversecretion of endolymph

The most predominating symptom of this disease, and the one which causes greatest disability, is the recurring vertigo The most consistent symptom, and the one which is necessary for diagnosis, is the loss of hearing which begins as a low tone inner ear impairment Other auditory symptoms which vary greatly but may be so severe as to be of great subjective concern are low pitched tinnitus a sense of blockage in the ear and a disagreeable disturbance of the quality of the tone usually a diplacusis The auditory symptoms fluctuate in severity and the threshold varies widely from time to time, but the loss tends to become progressively greater

The diagnosis is usually made when both auditory symptoms and vertigo are present In the infrequent case however it is possible to make the diagnosis on the basis of the characteristic nature of the auditory symptoms without the presence of vertigo

The use of surgery in the treatment of the disease has been directed primarily at the prevention of vertigo Although this has been consistently accomplished by a number of methods, no treatment can be considered wholly satisfactory unless the effect on the auditory apparatus is also favorable

In view of the nature of the pathologic lesion in the ear, surgery cannot be expected to cause any great improvement in hearing Also since the disagreeable tinnitus and diplacusis probably take origin from the same cause as the hearing loss, it is unlikely that surgery can relieve them without destroying auditory function

At the present time surgery is used as a last resort in those cases which have not been sufficiently helped by medical therapy The percentage of such cases varies according to different reports, but would appear to be somewhere between ten and twenty

Meniere's disease is a unilateral process in approximately ninety percent When bilateral the time of onset in the second ear varies It may be soon or not until four or five years after the first The hearing loss may be about equal or may continue to be greater in the originally involved ear

In the bilateral case a surgical procedure that may destroy hearing is unsuitable, except in the cases where the symptoms can be definitely ascribed to the ear with much the poorer function

In the unilateral case the preservation of the remaining hearing is usually of little service to the patient except as a reserve that might be used in case of injury to, or similar involvement of the other ear This latter possibility is of sufficient importance to warrant a search for a surgical procedure which might permit selective destruction of the vestibular function by the relatively safe intralabyrinthine route

Intracranial division of the vestibular fibres of the eighth nerve, first performed by McKenzie[1] and strongly recommended by Dandy[2] preserves auditory function The method has given excellent results but falls short of an ideal treatment in that the process in the inner ear is probably not impeded or influenced, also that the intracranial approach may carry some operative risk if not expertly carried out

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* Division of Otolaryngology of the University of Chicago Read before the Thirteenth National Assembly United States Chapter International College of Surgeons St Louis Nov 15 20 1948

LABYRINTHINE SURGERY

Surgical procedures on the labyrinth have attracted much attention because of the simplicity with which they can be carried out and the absence of operative risk.

PORTMANN'S OPERATION:[3] DRAINAGE OF THE SACCUS ENDOLYMPHATICUS

Portmann's operation consisting of drainage of the saccus endolymphaticus was conceived before the pathological process was known. The discovery by Hallpike and Cairns[4] of a hydrops of the labyrinth in Ménière's disease appeared to strengthen Portmann's thesis that drainage of the saccus was a logical procedure. Portmann reported good results but the experience of others in smaller numbers of cases has been less favorable and the method is not in general use.

EXPERIMENTS ON THE SACCUS AND DUCTUS ENDOLYMPHATICUS

In order to demonstrate the effect of simple drainage of the saccus and ductus endolymphaticus, and also to obtain experimental evidence regarding the function of these structures in the maintenance of the volume of endolymph a series of experiments was done in the monkey. These consisted of both simple drainage of the saccus and various degrees of destruction of the ductus endolymphaticus.[5] In three ears the saccus and medial convoluted part of the ductus, described as Sinus ii by Anson and Wilson,[6] were completely destroyed. After a period of between three and one-half and four months, the defect was completely filled in by new bone and marrow, but the remainder of the endolymphatic system and the sensory organs showed no histological variation from the normal.

The conclusion seemed warranted from these experiments that the maintenance of a normal volume of endolymph is not dependent upon a functioning ductus endolymphaticus or even upon its existence. Also the occurrence of a hydrops or Ménière's disease can not be attributed to interference with normal absorption of endolymph from its dilated and [illegible] middle portion.

Moreover, it was demonstrated clearly that drainage and partial destruction of the saccus was followed by sealing off and healing of the defect without any demonstrable effect on the labyrinth beyond.

Any effect of Portmann's operation on Ménière's disease would be of relatively brief duration.

ALCOHOL INJECTION

The injection of alcohol into the labyrinth has been used chiefly in England. Mollison[7] opened the external semicircular canal and injected three minims of absolute alcohol after first withdrawing a similar amount of perilymph. Reports by him and also by Wright[8] and McDowall[9] who used the same method have been favorable as regards prevention of vertigo although not completely successful. Deafness followed in all cases. Tinnitus has however remained undiminished in as many as one-third of the latter's cases.

Ablation of a Membranous Semicircular Canal: Removal of a part of the membranous horizontal semicircular canal has sometimes occurred accidentally during the fenestration procedure for otosclerosis, usually during a revision. Personal experience in two such cases was that a further loss of hearing occurred postoperatively, and the fistula response was negative. This was followed in several weeks by a return of hearing to the preoperative level for speech frequencies. The fistula response never became positive.

Although reports are lacking in the literature, personal communications indicate that the experience of others has been similar in at least some of their cases. There is evidence that removal of part of the membranous canal, without its ampullary end, destroys function of that canal but does not destroy hearing in at least many of the cases.

In the fenestrated monkey's ear destruction and obliteration of one canal produces no histologic change in the vestibule or in the auditory apparatus.

Cawthorne[10] has treated a large number of cases of Ménière's disease by removal of the ampullary end of the membranous horizontal canal apparently along with its ampulla.

Consistently he has reported good results in preventing attacks of vertigo but all cases were reported to be deaf in the operated ear.

It would seem that these results in Ménière's disease do not correspond to the experience with otosclerotics Also the histologic findings in the monkey's ear suggest that if the injury is limited to the canal and its ampulla the auditory apparatus escapes injury

Coagulation of the Labyrinth Coagulation of the horizontal membranous canal, ampulla and the vestibule through a small fistula near the ampulla in cases of Meniere's disease was first reported by Day [11] His results in preventing further attacks of vertigo have been uniformly good He reported relief of tinnitus in nearly all cases and a preservation of useful hearing in approximately 10 per cent He has had no complications from the operation McNally[12] has reported one case in which there was a facial palsy for several months following coagulation thereby indicating that the facial nerve is not completely free from the danger of injury

The experience of others for example Sullivan—as reported by Ireland [13] who used the coagulation procedure in the vestibule, discovered that profound deafness followed without exception

The explanation of Day's more favorable experience suggests the possibility of some variation in technic, such as his stated practice of withdrawing the coagulating tip slightly after it has impinged on the wall of the vestibule, before applying the current

The author's experience with the coagulation procedure in Meniere's disease has been limited to eight cases In most cases the coagulation was limited to the membranous horizontal canal and its ampulla but was sufficiently strong and repeated so as to destroy these structures In some the coagulation undoubtedly involved the utricle

In one case the coagulation was applied to two canals at approximately a maximum distance from the ampullas In all cases the hearing loss was increased to the point where no definite hearing could be demonstrated although it was tested over long periods of time

Prevention of attacks of vertigo was accomplished in five cases One case could not be followed up and two cases developed occasional mild vertigo which was apparently caused by the opposite ear

In some patients there was intermittent low pitched tinnitus after several months had elapsed Along with it there was a sense of blockage in the ear which, although not as severe as before operation was sufficient to cause some apprehension that it might be followed by an attack of vertigo

Discussion When the results of Day's cases are combined with those of others who have used the coagulation procedure and the experience with coagulation limited to the canals and ampullas only it would appear that preservation of hearing can be anticipated only occasionally—or at most—in a small minority of such cases

The coagulation procedure has been successful as a means of preventing attacks of vertigo and subjectively has been a satisfactory treatment In most cases the further loss of hearing causes no disability, but it is of sufficient importance to limit this form of surgical therapy to a relatively small percentage of cases An intralabyrinthine surgical procedure which would consistently preserve hearing while preventing vertigo would undoubtedly become a treatment of choice in a much larger group

ANIMAL EXPERIMENTS ON COAGULATION AND INTRALABYRINTHINE NERVE INJURIES

A series of experiments on the rabbit's ear (done in our laboratory by Dr Bruce Proctor before penicillin was available—but not reported) showed that instrumentation within the vestibule, in the attempt to rupture or injure the utricle resulted in extensive fibrosis in the perilymphatic spaces, varying degrees of hydrops, and degeneration of sensory organs These results, along with early experiences with operations on the human ear, led to further experiments to determine the extent to which the vestibular apparatus might be injured by coagulation or instrumentation without causing histologic changes in the auditory sense organ More recently the effects of the use of the coagulating current within the vestibule have been demonstrated by Schall and Tom Rambo [15] These men have confirmed the improbability of preserving hearing in more than a minority of cases when treated by coagulation within the vestibule

The following experiments were done on the monkey's ear during the past several years to determine their effect on the histologic appearance of the auditory sense organ: coagulation of the ampulla of the horizontal canal, coagulation of all canals at maximum distance from the vestibule, injury to the nerves to the horizontal canal ampulla and to the utricle. In one case there was detachment of the otolithic membrane of the utricle. The introduction of the coagulating tip and the use of current was not strong enough to cause bubbling or visible changes, although sufficiently strong enough to produce a facial nerve stimulus.

All ears were prepared and examined histologically. In practically all cases histologic *evidence of the injury to the vestibular apparatus* was shown. It was found that in no case had the injury resulted in any extensive change, or fibrosis in the perilymphatic space of the vestibule.

In one animal sacrificed within 24 hours of coagulation, there were collections of red blood cells in the perilymphatic spaces and an altered staining reaction of the perilymph. In all the others sacrificed, there was no evidence of hemorrhage after several days or weeks.

The procedures consisting of limited instrumental injury to the ampullary nerve and utricle, or coagulation to the canals and ampullas caused no histologic change in the auditory apparatus. In no case was there more than a minimal amount of fibrous tissue in the perilymphatic cistern.

In the ear, which was fixed within 24 hours after the coagulation, there was some suggestion of a chemical change in the perilymph as indicated by the altered staining reaction.

The histologic findings in these ears failed to provide an explanation for the profound loss of hearing which occurred in humans where the coagulation procedure only had been limited to canals or their ampullas.

SIMPLE FENESTRATION, DECOMPRESSION OF PERILYMPH, INTRALABYRINTHINE NERVE INJURIES

In the search for a method to prevent vertigo while preserving cochlear function, several procedures were carried out on humans with intractable Ménière's disease.

Case 1: G. R., [illegible], age 40. Advanced unilateral Ménière's disease unrelieved by medical therapy. Serious disability from vertigo and average hearing loss of over 60 Db in speech frequencies. This patient had a previously healed radical mastoid cavity. On July 15, 1940, a fenestra was made near the horizontal canal ampulla and a barbed dental broach passed through the ampullary nerve into the vestibule in an anterior direction until it impinged on the opposite wall and then was withdrawn. This was repeated. No bleeding or visible injury to the membranous canal or its ampulla was observed despite the use of the barbed instrument. The fenestra was covered with a skin flap. The hearing in the ear was further impaired to a state of profound deafness. Vertigo was relieved except for mild recurrences on infrequent occasions but no longer caused any disability.

Although the ear was profoundly deaf, tinnitus and a sense of blockage of mild degree have been intermittently present. The fistula response has remained active and the fenestra is visible through the thin covering skin. The response to cold caloric stimulation with ice water was absent two months following operation but since that time, it has become active to an approximately normal degree. There has been no Tullio phenomenon.

Case 2: E. B., female, age 32. Unilateral Ménière's disease for three years, unrelieved by medical therapy. Fluctuating hearing threshold averaging about a 40 Db loss for speech frequencies. On April 3, 1945, a simple mastoidectomy was done and a fenestra made in the horizontal canal near the ampulla. An unbarbed dental broach was passed anteriorly through the nerve to the ampulla until it impinged on the wall of the vestibule in the attempt to damage the nerve to the utricle. This was repeated. There was no visible injury to the membranous canal or ampulla and no hemorrhage.

The middle ear conducting apparatus was avoided entirely. No covering was applied to the fenestra. A few sulfathiazole crystals were sprinkled in the cavity and the wound closed. Penicillin was given for several days.

The wound healed by first intention. Afterwards deafness was found to be profound in the operated ear. The fistula response remained strongly active. On pressure—strenuous noseblowing and sneezing resulted. A Tullio[14] reaction was present on exposure to loud sounds or noises, and caused great annoyance. Although the ear was deaf, an intermittent sense of blockage and tinnitus persisted. While the fistula response was strongly active, the cold caloric response was found to be diminished with the head at 60 degrees backwards. Attacks of vertigo were infrequent but of sufficient severity that a secondary operation was done on June 12, 1946. This date was over fourteen months after the first operation At this time the mastoid cavity was found to consist of one large air cell, the lining mucoperiosteum of which formed the covering of the fenestra The fenestra was widely open

The membranous canal and ampulla were then destroyed by coagulation The coagulating tip extended slightly into the vestibule

After operation vertigo was moderate—receding gradually over several weeks No further attacks of vertigo had occurred when last observed several months after operation

Case 3 E M H, male, age 55 Unilateral Meniere's disease for two years, which had resisted medical therapy and was a serious hazard for his occupation of railroad switchman There was an average hearing threshold loss of about 35 Db for speech frequencies

On May 12, 1945, a simple mastoidectomy was done A fenestra was made as in case 2 with a similar attempt to injure the nerves to the horizontal canal ampulla and utricle The wound was closed in a similar manner with no covering being placed over the fistula Sulfathiazole crystals were dusted into the wound and penicillin given parenterally postoperatively Recovery was rapid The ear was profoundly deaf after operation and has remained so until the present time There is still a slight hissing type of tinnitus in the ear but the severe noises have been relieved An active Tullio phenomenon[14] has been present since operation and is activated by such sudden sounds as steam hissing from a locomotive, grinding of car wheels, and ringing of an engine's bell

The fistula response remains strongly positive on pressure over the mastoid scar There have been occasional mild attacks of dizziness but the patient considered himself sufficiently relieved to remove the hazard and he wished no further treatment

Case 4 J B, male, age 51 Meniere's disease in the right ear of about twenty years' duration with threshold hearing loss of over 60 Db for speech frequencies He also had a threshold hearing loss in the left ear which was less marked but which showed wide fluctuations for speech frequencies Although the patient referred most of his complaints to the more impaired ear, a diagnosis of early Meniere's disease in the better ear seemed indicated as well

For the purpose of obtaining further information, a two stage operation of the more impaired ear was decided upon On October 11, 1946, a simple mastoidectomy was done as in cases 2 and 3 There was no mastoid pneumatization but a moderately large antrum was found A simple fenestra was made without injuring the membranous labyrinth and without attempting any interference within the bony labyrinth No covering was placed over the fenestra The wound was closed after dusting in a few sulfathiazole crystals Penicillin was given for several days

Recovery from the operation was rapid The ear, which had about 60 Db threshold loss for speech frequencies before operation, was totally deaf to a loud shout and to the audiometer thereafter when the opposite ear was masked

An active fistula response persisted, as well as annoying vertigo whenever he was close to loud noises (Tullio phenomenon) The tinnitus was not relieved Attacks of vertigo persisted, as well as that which occurred because of the open fistula Seven months after the first operation the wound was reopened for inspection of the fenestra and coagulation of the membranous labyrinth Again the antrum was pneumatized and the fenestra was found to be widely open and covered by the semitransparent mucoperiosteum The canal and ampulla were then coagulated The coagulating tip being extended into the vestibule but not to the opposite wall

Following coagulation there has been relief from the Tullio reaction and from the vertigo related to the open fenestra but there have also been occasional spontaneous attacks of vertigo which may have originated from the other ear

Tinnitus has also been present but not well localized to either ear

DISCUSSION

The experience with these cases has permitted several significant observations

1 Decompression of perilymph is of no value as a relief to Meniere's disease, or hydrops of the labyrinth

2 A fistula made in a bony semicircular canal through a simple mastoidectomy approach and left uncovered will probably remain a permanently open fenestra[14] which is undesirable because of the associated fistula symptom and Tullio phenomenon Also a fenestra covered only by mucosa might offer less resistance to infection in case of subsequent middle ear suppuration

Closure of a fistula can be assured at operation by making a very small opening and leaving bone chips in it, and probably by destruction or removal of the membranous labyrinth

3 The depression of the hearing threshold to a state of profound deafness in all four of these ears including that in which only a simple fenestra was created, suggests that the

existence of a third window into the labyrinth in the presence of an intact conducting mechanism results in a definite threshold loss.

Whether such a hearing loss in the first three cases would have been avoided by causing the fistulas to close, thereby limiting the procedure to the intralabyrinthine injury, has not yet been determined.

SUMMARY

1. The prevention of attacks of vertigo along with destruction of auditory function has been formerly accomplished by labyrinthectomy operations, all of which involve extensive destruction of structures in the vestibule. Efforts to prevent vertigo by intralabyrinthine surgery, without causing destruction of hearing, have so far met with limited success. The following procedures have been done on humans:

a. Portmann's operation on the saccus endolymphaticus. This operation has preserved the hearing but has failed to give sufficiently good results in prevention of vertigo.

Experiments on the monkey have shown that drainage or destruction of the saccus, as well as nearly all of the ductus endolymphaticus, is followed by prompt healing and could only have a limited effect on a hydrops of the labyrinth.

b. Injection of alcohol.

c. Ablation of the ampullary end of the horizontal semicircular canal has been reported by Cawthorne to prevent attacks of vertigo consistently but also to cause deafness.

Accidental removal of part of the membranous canal at the fenestration operation or its revision causes temporary deafness, but hearing frequently returns to the previous level.

Obliteration of the horizontal canal for several millimeters distal to the ampulla in the monkey causes no histologic change in the auditory apparatus in most instances.

d. Coagulation of the ampullated end of the horizontal canal, with the tip of the instrument extending into the vestibule (Day's procedure) has prevented vertigo attacks consistently. Preservation of hearing occurred in [illegible] 10 per cent of Day's cases but not in [illegible] reported by others.

e. Coagulation limited to one or more canals without entering the vestibule has prevented attacks of vertigo, but created profound deafness. It did not always abolish intermittent tinnitus and sense of blockage in the ear. In the monkey, no histologic evidence of injury to the auditory apparatus was caused.

f. Decompression of perilymph is of no value in the treatment of Ménière's disease.

g. A simple fistula in the horizontal canal, if made after simple mastoidectomy and left uncovered (the mastoid wound being closed), remains as an open fenestra beneath the mucosa which later lines the mastoid antrum. Such a fenestra in the presence of Ménière's disease is undesirable because of the further loss of hearing which occurs, the disturbing Tullio reaction and the possible tendency to facilitate infection of the labyrinth in case of a middle ear infection.

Closure of a fistula can be assured by keeping it a minimum size, leaving bone dust in it, and by destroying the membranous canal.

h. The histologic evidence obtained from monkey experiments, as well as the experience of Day in his use of coagulation on the human, lend encouragement to the search for a means of interrupting vestibular function without injuring the auditory apparatus. Further investigations are being carried out in which sound conditioned animals are utilized as well as histologic controls.

RIASSUNTO

Per prevenire gli attacchi di vertigine, con distruzione della funzione auditiva, sono state escogitate varie forme di labirintectomia, le quali coinvolgono estese distruzioni delle formazioni del vestibolo. La chirurgia del labirinto in questa malattia ha incontrato quindi finora pochi successi.

SUMARIO

La eliminacion de ataques de vertigo en la enfermedad de Meniere se obtiene al presente practicando la laberintectomia con destruccion muy extensa de la region del vestibulo y que da por resultado gran perdida de las funciones auditorias. Los esfuerzos del presente de tratar esta enfermedad por la cirujia intralaberintica solo ha dado exitos muy limitados.

SOMMAIRE

Comme remede aux attaques de vertiges accompagnées de destruction de la fonction auditive, on a beaucoup recours à la labyrinthectomie, operation entrainant une destruction étendue des elements du vestibule Les efforts de la chirurgie intralabyrinthine sans destruction de la fonction auditive n'ont donne que rarement de bons resultats

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Total Gastrectomy in Carcinoma of the Stomach

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UNTIL recently carcinoma of the stomach presented the gloomiest picture in medicine. Every year 150,000 people die of cancer, of these, from 25 percent to 40 percent are gastric neoplasms.[1, 2] Of those who have applied for treatment, only four percent[3] live five years.

Unfortunately, many cases (50 to 60 percent of the cases) are seen too late, two-thirds of these are due to the patient's neglect and one-third are misdiagnosed.

Gastric carcinoma occurs so insidiously, that x-ray, gastroscopic examinations, laboratory work, and even laparotomy should be done if necessary, in order to establish an early diagnosis. One must not wait until the typical textbook picture is present. It has been found that routine x-ray examination of all adults is not feasible; therefore, one must always suspect carcinoma of the stomach, particularly in those people over 35 years of age, and where the following symptoms are present a complete investigation must be done:

1. Indigestion occurring the first time, fairly late in life and not yielding to ordinary measures.
2. Known ulcer patients who do not experience the usual relief with treatment.
3. Symptoms of ulcer appearing late in life.
4. A group in which fatigability, lack of concentration and judgment, and possible anemia occurs.

In 1943, Graham[4] said "Gastric carcinoma is not the hopeless disease so many patients and physicians believe. Many surgeons could recall survivals of 15 years or more, and if the primary mortality of total gastrectomy can be lowered, it may be possible to present patients who have survived a surprisingly long [illegible] without recurrence."

Apparently that time has come. Longmire[7] [illegible] his series and reviewing those of Harvey, [illegible] Ross, Robson and Coller.[8] Jones [illegible] in this idea.

[illegible] only hope for relief and

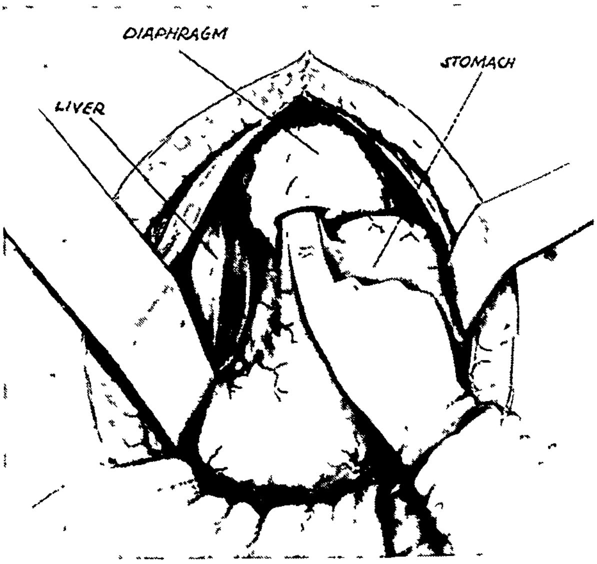

Fig. 1. Abdominal Route: Freeing of esophagus from the diaphragm and palpating for esophageal nodes.

possible cure, and total gastrectomy which formerly was reserved for linitis plastica cases, which represent five percent of all gastric carcinoma, carcinoma of the cardia and the larger lesions of the rest of the stomach, should now be used for the smaller and earlier lesions.

This operation, with dissection of the regional lymph nodes (which are involved in 75.5 percent of the cases),[9] represents the modern method of block excision. In 25 percent of the patients, one cannot palpate the upper margin of the lesion, and, therefore, subtotal gastrectomy is not as efficient, although five year[1] survivals are 25 percent with the nodes involved, and 60 percent if there is no node involvement.[1]

The chief deterrents to total gastrectomy were the fear of high mortality and altered physiologic functions. Modern metabolic studies[11, 12] have shown the absorption of carbohydrate, protein and fat, in most cases, is normal. However, fat metabolism sometimes presents a problem; occasionally there is an excess loss of fat or a high normal fat loss.

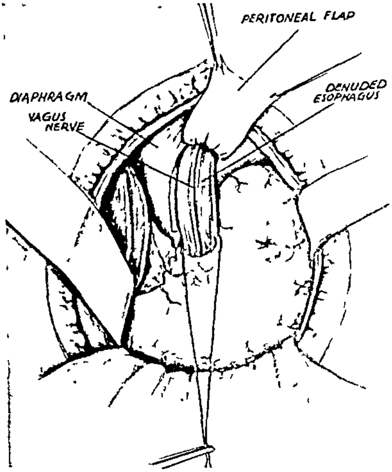

Fig. 2. Abdominal Route: Left lateral ligament of the liver cut; liver retracted to the right Esophagus pulled down, peritoneal flaps reflected and vagi ready to be cut.

The normal loss of fat in dried feces, from five to ten gms. with an intake of 60 gms. This disturbance of fat metabolism accounts, in great part, for the failure of some of these patients to gain weight. Calcium and phosphorus is normal, as shown by the absence of osteoporosis and the presence of normal serum levels. Iron absorption is deficient in some cases. It is due to lack of hydrochloric acid, and hypochromic anemia ensues.

Pernicious anemia or pernicious-like anemia may occur, due to the loss of the intrinsic factor. Vitamins B, C and K absorption is normal, but vitamins A and D exhibit a delay. The loss of reservoir function is not missed. Spontaneous hypoglycemia occurs at times.

In view of the foregoing it will be seen, the effects of total gastrectomy are not sufficient to preclude it being done. Hypochromic anemia can be corrected by the administration of iron. Pernicious anemia or pernicious-like anemia, by the use of liver extract. The spontaneous hypoglycemia by regulation of the diet.

The disturbance of fat absorption can now be corrected by a new product, a non-ionic surface acting agent, polyoxyethelenesorbitan monoleate, known as P.S.M., which increases absorption of the fat from the small bowel, which will help to correct the main worry and chief complaint of the patient—the inability to gain weight Ordinarily an increase of milk, meat and bread in the diet, and to chew the food well, will correct most of the dietetic insufficiencies in the average patient.

The great, possibly the greatest deterrent, was the high mortality rate in this procedure (50 60 percent) Today, however, the mortality rate has been reduced precipitously, and, in several small series, the mortality has been nil (Table 1) This is due to the advances in preoperative and postoperative treatment, better technique, chemotherapy, antibiotics, and a great improvement in anesthesia

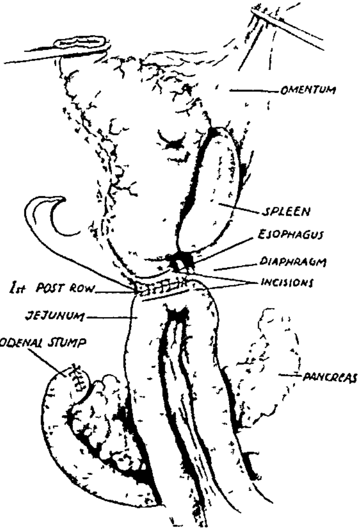

Fig. 3. Abdominal Route: Vessels have been cut and ligated; duodenum cut across, stomach pulled upward and to the left Jejunum anastomosed to the posterior wall of the esophagus with interrupted silk sutures. Esophagus and jejunum incised

Indications for Operation: Perform total gastrectomy for carcinoma whenever possible.

Contra-Indications:

A. Absolute.

Before Exploration: Cacchexia, ascites, a positive rectal shelf, supraclavicular nodes, marked liver involvement, umbilical metastases (?).

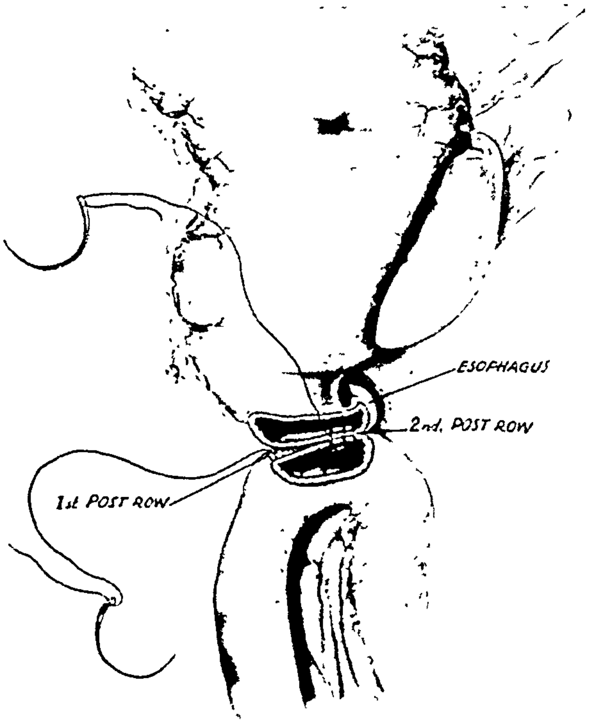

Fig. 4. Abdominal Route: Second posterior row of sutures inserted through and through.

On Exploration: Involvement of the nodes in the jejunal fossa, shot-like metastases in the root of the mesentery of the small intestine, peritoneal seeding, extensive involvement of the glands which cannot be removed, especiall[illegible] at the angle of the greater curvature and [illegible]lorus, and on the inner aspect of the first pa[illegible] of the duodenum.

B. Relative.

(1) Fixation of the mass, particularly t[illegible]
the head or body of the pancreas. (2) Involvement of the transverse colon. (3) Involvement
of the small intestine. (4 [illegible]nvolvement of the
[illegible] wall. (5) I[illegible] t of the para-
[illegible] (6) [illegible] ema at the
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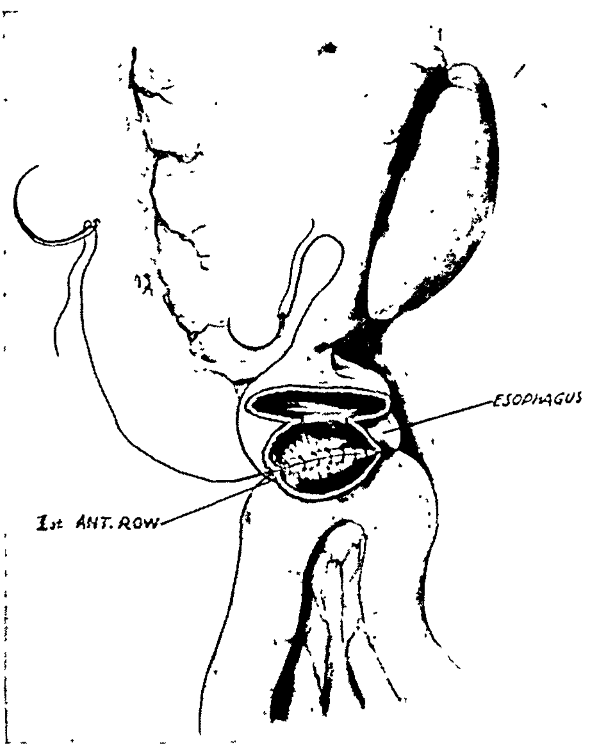

Fig. 5. Abdominal Route: The esophagus is cut off as first anterior row of suturing proceeds. This is a continuous suture.

resection of the involved area may also be done in addition to gastrectomy.

Resectability: Neither the size of the lesion nor the duration of the symptoms indicate the resectability of a lesion, even x-ray does not give one a true picture. It was reported that 14.3 percent of those x-rayed were deemed inoperable and 23.3 percent apparently were doubtful as to operability, yet all o[illegible] these were
found to be resectable. P[illegible] esection
rate is 40 percent of all ga[illegible] r cases
[illegible]t as they are, as they e[illegible] r."
[illegible]ner,[23] University of [illegible] d the
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[illegible] tal gastrectomy in t[illegible] been
[illegible] or less; about 2[illegible] ving
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TABLE 1. MORTALITY RATES

YEAR	NAME	NO. OF CASES	MORTALITY
1929	Finney & Reinhoff[16]	67	53.8%
1917-1933	Mayo Clinic (Waugh *et al*)	33	60.6%
1940-1943	Mayo Clinic (Waugh *et al*)	44	31.8%
1943-on	Mayo Clinic (Waugh *et al*)	20	25%
1938	Allen, Mass. General Hosp.[18]	16	50%
1946	Allen, Mass. General Hosp.[19]	84	
		(30 Transthoracic)	40%
1946	Lahey	89	29.2%
	Pack & McNeer[20] (Collected Series)	303	
Before 1921			49.3%
1921-1930			37.6%
1931-1942			34.3%
1943	Horsley[6]	3	0%
1943	Sweet[21]	7	28.5%
1945	Longmere[5]	20	10%
1945	Jones & Kehm[8]	8	0%
1946	Moreland[22].	6	0%
1946-1947	Halligan, Perkel & Catlaw	8	0%
		(4 Abdominal)	
		(4 Abdominothoracic)	

shock (Champ Lyons) with a contracted vascular bed and a smaller blood volume, and the blood count does not reveal the evidence of the true condition.

Whole blood transfusions must be used preoperatively, during the operation, and postoperatively. Shock must be prevented at all costs. In our small series of cases, shock has never been a factor.

The use of amino acids is excellent in taking care of daily needs, if 70 percent caloric requirements are met with by carbohydrates, but are not effective for about 12 days, for the correction of hypoprotonemia. All protein given is first utilized to promote hemoglobin formation. The stomach is lavaged with saline, routinely, twice daily. In addition, dextrose in distilled water with vitamin B and C is given, intravenously, as food absorption is always interfered with; penicillin in oil, 300,000 units, is given for two days, preoperatively and postoperatively, as long as it is necessary. Inhalation of penicillin is given where the thoracic approach is used. The Levin tube is inserted before the operation and left in situ. In some patients it has been removed accidentally, postoperatively, with no bad results.

Anesthesia: In transthoracic and abdominothoracic operations, intratracheal anesthesia is used

Continuous spinal of pontocaine and dextrose are used for the abdominal approach. In the old, the markedly debilitated, and those with cardiac, renal, or diabetic complications, we use intercostal block, with posterior splanchnic analgesia.

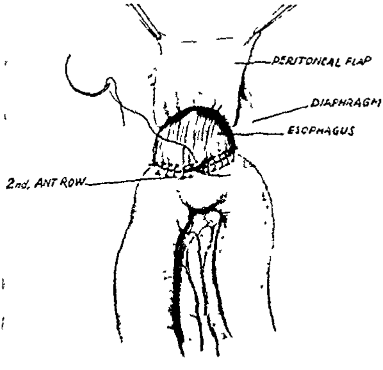

Fig. 6. Abdominal Route: Second anterior row of sutures are interrupted silk.

OPERATION

By means of a long, left rectus incision the abdomen is explored and if operation is feasible, the left lateral ligament is cut, the liver is retracted to the right, the peritoneal flaps are outlined and fashioned on the diaphragm, and elevated. The vagii are exposed. The position of the right vagus nerve on the anterior surface varies anywhere from the middle of the esophagus to just lateral to it. The right vagus varies in position from the middle of the posterior surface of the esophagus to just medial to it. The vagus nerves are cut; this allows mobilization of the esophagus, and in addition, relieves pain and vomiting due to traction, and lessens shock.

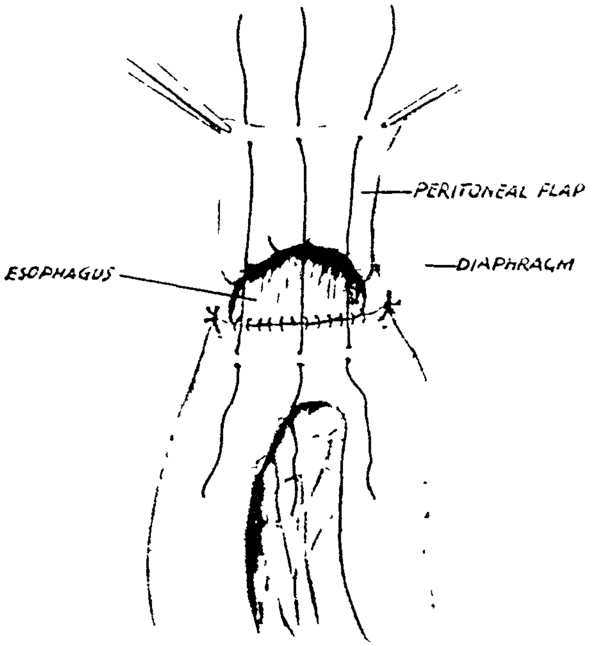

Fig. 7 Abdominal Route: Peritoneal flap is sutured to the jejunum beyond the suture line. The jejunum is then suspended to the diaphragm by interrupted sutures.

The paraesophageal nodes are palpated and if involved the patients may be inoperable. The omentum is mobilized from the transverse colon. The right and left gastro-epiploic vessels are ligated. The duodenum is cut across and closed with three layers of sutures, the [illegible] silk or fine wire. The stomach is [illegible] left. The left gastric artery [illegible] the celiac. All the glands are removed, with their respective vessels.

The splenic vessels are ligated proximally and clamped near the spleen and cut. The jejunum is brought up anterior to the colon and is now united to the posterior wall of the esophagus with interrupted silk sutures.

The posterior wall of the esophagus and jejunum are opened and a second posterior layer of sutures, continuous chromic catgut sutures, which is continued as a first anterior row of sutures; the esophagus is cut off as suturing proceeds. The second anterior row is of interrupted black silk. The peritoneal flap is sutured to the jejunum, covering the anastomosis. The jejunum is anchored to the diaphragm with black silk sutures. The peritoneum is closed with chromic catgut. The fascia with fine steel wire and the skin in sutured with silk.

Abdominothoracic Approach (four cases): The patient is placed on the right side, tilted back from about five to ten degrees. The arm is held over the head.

A high left rectus incision is used, the abdomen is explored, and, if operation is feasible, the incision is extended out through the costal cartilage and left eighth interspace, through the muscles and pleura. Retractors spread the ribs apart. The diaphragm is incised radially from the hiatus to the ribs. This type of incision gives you the greatest exposure of both the chest and the abdomen.

The technique of removing the stomach, lymph nodes, omentum and spleen is the same as in the abdominal approach, except that the esophagus can be mobilized more freely and removed at a higher level.

The jejunum is brought up anterior to the colon; often the jejunum will only reach about three cm. above the diaphragm, so the main jejunal vessels are cut carefully, preserving the arches, this gives one about three inches more above the diaphragm.

The anastomosis is the same. Enteroanastomosis sometimes is performed. The diaphragm is closed around the loops of the jejunum. The chest and abdomen are closed in the usual way. Drainage of the chest with a catheter under water, may or may not be done.

Postoperative Treatment: Maintain fluid and electrolyte balance, employ dextrose,

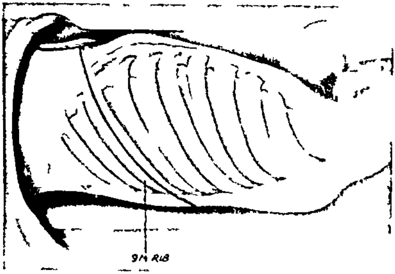

Fig 8 Abdominothoracic Route Patient on left side tilted backward 5 feet, arm above head Left rectus incision, abdomen explored incision carried out through eighth intercostal space

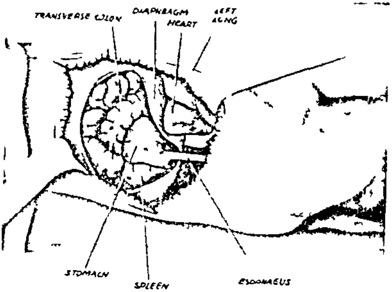

Fig 9 Abdominothoracic Route Diaphragm has been incised from hiatus to costal margin Note wide exposure obtained

amino acids, and transfusions Penicillin in oil, 300,000 units is given twice daily for several days Continuous suction is maintained for four days The tube is then removed and the patient is allowed water tea without milk clear broth is allowed one ounce every hour gradually increasing this amount until the seventh day After the seventh day fluids are allowed freely The tenth day a soft diet is permitted, the sixteenth day a regular diet is given Carbon dioxide inhalations are given routinely

Peritonitis with leakage has been the chief complication and cause of death This led Graham to devise a special type of operation The pulmonary complications are chiefly pneumonia and atelectasis Other complications are cardiac failure subphrenic abscess pulmonary embolism and volvulus of the jejunum

All the above complications are not necessarily fatal Occasionally persistent diarrhea has been noted after total gastrectomy We have had none in our series of cases

Iron is given in the form of ferri sulphate, routinely Stricture at the site of the anastomosis may occur but can be relieved by the passage of bougies One of our patients complained of a sensation of burning when he first began to eat but after swallowing two or more mouthfuls this would disappear Recurrences occur most frequently in the liver and the peritoneum even if this does occur, the patient s life has been prolonged and they are vastly more comfortable than they would have been with their original lesion

Eight cases of total gastrectomy without a mortality are reported Four by the abdominal route and four by the abdominothoracic route using the Garlock incision The first of this series was done in October 1946 and the last December 23 1947

The four abdominothoracic cases were lesions of the cardia the others of the body All were large extensive lesions The postoperative course of two was marked by pulmonary complications that is atelectasis in one and pneumonia in the other but, with judicious use of penicillin they both recovered

The first patient gained 26 pounds and is back to normal weight The others remain at least 10 to 15 pounds under their usual weight All have been able to eat well and indiscriminately with the exception of two who have to eat smaller meals but more frequently There has been no diarrhea nor stricture at the site of the anastomosis It is almost too early for anemia to appear, but they are taking iron

SUMMARY

Total gastrectomy is advocated for earlier and smaller lesions in carcinoma of the stomach The mortality rate in this operation has been reduced so that it is no longer prohibitive Physiologic functions following this operation are not altered sufficiently to pre

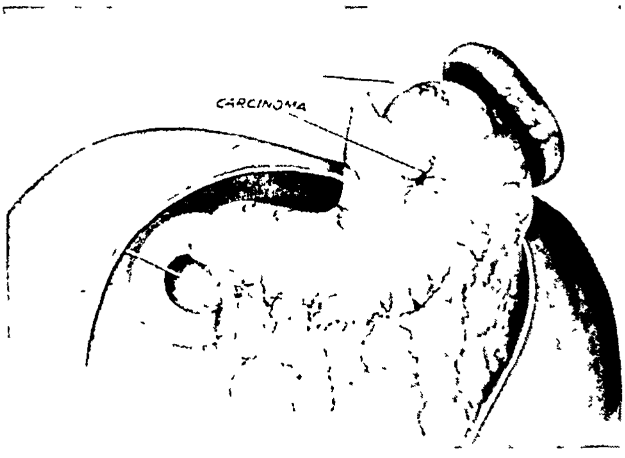

Fig. 10. Abdominothoracic Route: Level of resection of the esophagus with spleen and omentum attached.

clude its performance. Early diagnosis, while earnestly advocated, has proven to be a myth. A series of eight consecutive cases of total gastrectomy, without a mortality, is reported.

RIASSUNTO

L'A. riporta otto casi consecutivi sottoposti a gastrectomia totale senza alcuna mortalita'. Cio' dimostra che un'operazione del genere, che l'A. consiglia anche nei cancri iniziali e poco estesi, non e' piu' da considerarsi come proibitiva. Anche le modificate condizioni [illegible] dopo l'operazione non sono tali [illegible] l'intervento. L'unica nota stonata e' tutt'ora l'impossibilita' di una diagnosi veramente precoce.

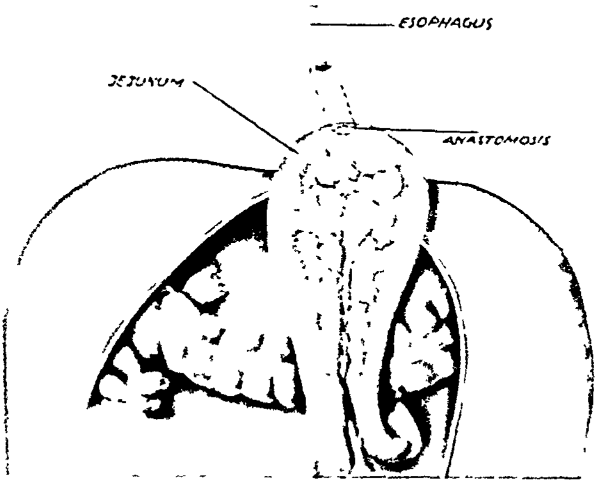

Fig. 11. Abdominothoracic Route: Anastomosis of [illegible] above diaphragm. Main vessels in [illegible] as advocated by Sweet, to bring [illegible] above the diaphragm.

SUMARIO

El autor recomienda la gastrectomia total en las lesiones canerosas peque nas y de poca duracion. La mortalidad con esta operacion se ha reducido lo suficiente para no ser ya prohibitiva. La funcion digestiva no se altera lo suficiente para precluir esta operacion. El diagnostico del cancer del estomago en sus comienzos es un mito. Se han reportado una serie de ocho casos consecutivos de gastrectomia total sin mortalidad.

SOMMAIRE

La gastrectomie totale est recommandée pour les lésions précoces et peu étendues du carcinome de l'estomac. Le taux de mortalité de cette opération a été reduit et l'opération n'est plus prohibée. Les fonctions physiologiques qui suivent cette opération ne sont pas altérées suffisamment pour l'interdire. L'auteur rapporte huit cas consécutifs de gastrectomie totale sans mortalité.

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The Preoperative and Postoperative Care of Carcinoma of the Rectum and Pelvic Colon*

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INTERNATIONALLY, the value of systematically planned preoperative, operative and postoperative measures in surgery for cancer of the rectum and pelvic colon have been so repeatedly emphasized that the general acceptance of these principles is now universal.

It is my privilege to bring to this assembly a summary of progress manifest in American Clinics as a result of the acceptance of a planned care of the cancer patient as presented herein.

The present status of mortality, respectability, operability, and survival can best be judged by observing statistics of followup in various centers where emphasis is on radical surgical cure, yet, where a different surgical approach to the problem in most cases is followed.

At the Memorial hospital in New York City, Binkley and Deddish consider the procedure of choice for resection of cancer of the rectum, the Miles abdominal perineal operation because it gives the patient the greatest chance of survival based on the assumption that, while eradicating the primary, it offers complete removal of the node bearing areas. The mortality rates as reported by Binkley and Deddish[1] are outstanding and reflect the strides of the time toward radical cure. From 1930 to 1939 they report a mortality rate of 16 percent. From 1940 to 1946, it was 2.3 percent. In 1939, 130 consecutive operations for rectal cancer were done without a death. The five year survival rate is 50 percent.

On the other side of the picture, Bacon in Philadelphia reports an equally startling series of radical cures. The procedure of choice [illegible] is the abdominal perineal proctosigmoidectomy with conservation of the sphincter mechanism. In 1946 at the International College Assembly, Lima, Peru,[2] a series was reported of 251 consecutive abdominal perineal proctosigmoidectomy operations with a mortality rate of 5.9 percent; 145 radical resections had been performed without a single death. Recently,[3] Bacon has completed 379 proctosigmoidectomies with 18 deaths—a mortality of about 4.8 percent. The five year cure rate, including those for palliation as well as for cure, is 52.6 percent. Of 560 cases employing various methods and reported recently,[4] 526 had been operated upon, giving an operability rate of 90.2 percent; 467 were resected—a resectability rate of 80.1 percent with a mortality from resection of 5.5 percent (26 deaths).

At the Bacon Department of Proctology, Temple University Hospital and Medical School, while all methods suitable at the time of operation for radical resection for cancer of the rectum are employed, it was found that the establishment of an abdominal colostomy and sacrifice of the sphincter muscles was unnecessary in a large percentage of cases. The proof of this is borne out by reflecting on the five year survival rate.

Jones[5] of the Cleveland Clinic reports 139 consecutive combined abdominal perineal resections of the rectum from October 1941 to June 1943 without operative mortality and 535 consecutive one stage abdominal perineal resections from 1942 to 1946 with 20 deaths—a mortality rate of 3.7 percent. His survival rate is 52 percent for five year cures.

Lahey[6] in 1946 reported a resectability rate of 83.5 percent and a mortality rate of 3.8 percent. A five year nonrecurrence rate for his entire series of 1800 cases was 50 percent. Dixon,[7] the champion of the anterior resection for low cancer of the rectum followed by establishment of intestinal continuity has reported 340 cases operated with a mortality rate of 5.9 percent from 1930 to 1945 and a mortality rate of only 1.1 percent for the last five years of that period. His five year survival rate nonpalliative (palliative cases excluded) is 67.7 percent.

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*[illegible] Assembly of the International [illegible]

**[illegible] of Proctology, St. [illegible] and Monroe County hos- [illegible] associate of Dr. [illegible] Temple Uni[illegible]

It is of interest to note that Doctor Dixon's[8] curiosity to follow the technique of anterior resection was aroused when he observed that patients on whom he had performed the Hartman operation continued to live many years without recurrence. It is also of interest to note here that Dixon[8] feels that the Miles operation is not sufficiently radical as his percentage of perineal recurrence was high. *He has now performed between 200 and 300* radical posterior perineal resections including levators and *part of the gluteus following single* barrel colostomy and preliminary ligation and division of the superior hemorrhoidal vessels. His results will shortly be forthcoming.

Gilchrist[9] like Dixon feels that unless the gland bearing area can be completely eradicated the low anterior resection should not be employed but that a Miles operation or a modification thereof should be used. His five year survival for resection of the colon and rectum on 114 cases was 57 percent. The operability rate on 200 cases reported was 75 percent.

Let us now look in retrospect to methods of preparation and postoperative care (Table 1).

Experience suggests that preoperative preparation paves the way for uneventful surgery and uneventful surgery carefully planned and performed paves the way for uneventful convalescence. *It is seldom less than a week that* such preparation can be carried out.

The preparation of the patient begins in the office where the success or failure of the operation can be decided. Personal experience proves it is best not to inform the patient the true nature of the condition. The word malignancy can indeed be a *frightening* word and often demoralizes the patient thus increasing operative risk. Next the patient is placed into a hospital ambulant. Habits of a *lifetime should not be disrupted abruptly.*

To evaluate the patient risk careful physical examination is carried out. This physical includes electrocardiographic study, vascular status, evaluation of hepatic dysfunction, degree of anemia, prostatic hypertrophy, urinary dysfunction and metabolic disturbances of sorts. Since a large percentage of patients with cancer of the rectum and colon present varying degrees of metabolic disturbance, hypoproteinemia and avitaminoses with associated *dehydration a concentrated effort* is made to place the patient in caloric, nitrogen, fluid and electrolyte balance as well as in a state of high vitamin concentration. High protein, high carbohydrate and low fat diet is *employed* consisting of *400* grams of carbohydrate, 120 grams protein and 50 grams of

TABLE 1 MORTALITY AND SURVIVAL RATES

CLINICS	NO. OF CASES	MORTALITY *Percent*	CONSECUTIVE OPS No Death	SURVIVAL 5 Yr *Percent*
Binkley—Memorial	—	2.3 (1940-1946)	130	50
Lahey—Lahey Clinic	1800	3.8	—	50[1]
Bacon—Temple University	370 A.P.P.S.***	4.8	145	52.6*
Jones—Cleveland Clinic	535 A.P.R.****	3.7 (1942-1946)	139	52*
Dixon—Mayo Clinic	340 A.R.*****	5.9 (1930-1945) 1.1 (1940-1945)	—	67.7**

* Palliative Cases Included
** Palliative Cases Excluded
*** Abdominal Perineal Proctosigmoidectomy
**** Abdominal Perineal Resections (Miles)
***** Low Anterior Resection—Intestinal Continuity Re-established.
1 5 Years without recurrence

fat. To supplement this, 100 grams of Delcos Granules are mixed daily with feedings.

Fluids are forced, if not otherwise contraindicated, to insure a urinary output of 1000 cc. All fluid intake and urinary output is carefully recorded on special fluid balance charts. This will serve as a guide in determining postoperative fluid tolerance and output (Table 2).

TABLE 2. DIET: LOW RESIDUE, HIGH PROTEIN, LOW FAT

	GRAMS	CALORIES
Carbohydrate	400	1600
Protein	120	480
Fat	50	450
Delcos Granules (Carbohydrate-Protein Mixture)	100	320
TOTAL	670	2850

Apparently something happens coincident with the presence of the neoplasm which seriously disturbs hepatic function. This so called hepatic dysfunction reflects itself in lowered plasma protein, anemia and hypoprothrombinemia. For this reason determined efforts are made to evaluate the preoperative liver.

On the Rectal Service, Memorial hospital, several criteria are used for determining hepatic *dysfunction*.[10] Plasma bilirubin levels are carefully observed both preoperatively and postoperatively especially when multiple transfusions are being administered. Bilirubin levels of one mgm. percent or slightly above are normal. If it is higher than that, 2.5 to 3 mgms., something wrong is suspected with the excretory ability of the liver. The second criteria is hypoproteinemia. Levels of 6.5 grams percent of protein are aspired to. At the Bacon Clinic studies were made on all cases with rectal cancer and it was reported[11] that 2[illegible]7 percent of the patients were hypoproteinemic.

The use of plasma, diet and hydrosylate is considered the best means of elevating protein [illegible] levels. Usually these patients are also [illegible] and sufficient blood in small daily [illegible] together with injections of crude [illegible] is given to raise the grams of [illegible] 14 percent and the erythrocyte count to at least four and a half million. In the presence, however, of elevated serum bilirubin, caution is advised toward the employment of whole blood. The third criteria to help determine liver dysfunction is hypothrombinemia. If it is remembered that vitamin K is necessary before prothrombin can be made by the liver, we should not wonder why low levels can be a serious matter.

Slow healing of wounds with oozing is often a sequela of this dysfunction which predisposes to sepsis and which in turn gives rise to postoperative loculations of pus and disruption of the postoperative incision. Vitamin K, mgm. 20, is given daily for three days prior to surgery, and for three days thereafter. Other useful adjuncts in helping to evaluate hepatic status are plasma level of vitamin A and the cephalin flocculation test.

It is a well known fact that vitamin levels in most patients with rectal and colonic cancer are low in proportion to low chlorides, proteins and other basic elements. Inasmuch as the ability of the organism to absorb vitamins is disturbed seriously, an attempt should be made to overwhelm the patient with extremely high concentrations of vitamins. Orally multiple vitamin capsules such as Zymacaps are prescribed T.I.D. Again three days preoperatively vitamin C, 1000 mgm. and Lyo B-C are supplemented intravenously. Where capillary fragility seems more marked than normal, Rutin, mgm. 20, is given daily.

ANTIBIOTIC THERAPY

It is generally agreed that the greatest single advance in surgery of the colon and rectum has been the discovery and the use of nonabsorbable sulfonamides and streptomycin. At the time the diagnosis of cancer is made the patient is placed on one of the nonabsorbable sulfonamide compounds. For a 70 kilogram patient, grams one and a half, Q.I.D. will produce the desired therapeutic effect in cleansing the colon.[12] Sulfathalidine is to be preferred to sulfasuxidine (succinylsulfathiazole) because dose for dose it is twice as effective for enteric bacteriostasis, it is less toxic[12, 13, 14, 15, 16] and it exerts a less diarrhetic effect on the stool.

In studies made on the potency of sulfathalidine on 54 cases including 19 proctosigrhoidectomies at Temple University hospital, Department of Proctology, it was shown that sulfathalidine was more potent than sulfasuxadine and that in many cases the quantitative coliform studies of the collected stool after five days' administration giving 0 1 gram per kilogram weight Q I D often showed a reduction from 200 million to 10 000 organisms in many cases Postoperatively as soon as the patient is able to tolerate any fluids by mouth, the preoperative dosage is begun

More recently we have supplemented streptomycin, and it is thought that the future in colonic surgery will hold more startling results Streptomycin has proven to be more potent than either succinylsulfathiazole or sulfathalidine when given orally at the rate of two grams (two million units) daily providing that it is not given for more than two days (48 hours) as it has been shown that after two grams have been given daily for two days, the coliform organisms develop a resistance to the drug, and regardless of the amount given thereafter, in most cases coliform organisms will continue to remultiply *and a reversion of count will be noted*[16, 17] Grams one quarter in two ounces of saline are given orally, Q 4 hours for two days preceding operation and discontinued the day of surgery

TABLE 3 ANTIOBIOTIC THERAPY

	PREOPERATIVE	POSTOPERATIVE
Sulfathalidine (Phthalyl sulfathiazole)	0 1 grams per kilogram wt (5 to 7 days)	Same dosage when oral fluids are tolerated
Streptomycin	2 grams daily (48 hrs before surgery) (0 25 grams Q 4 hrs for 48 hrs)	Same as preoperative, Intramuscularly—2 days
Penicillin (oil)	None	300 000 U I daily for 2 days
Sodium sulfathiazole	None	2 50 grams b i d i v 2 days

At the present time, I am also using grams two in saline in the peritoneal cavity following resections with open anastomosis Postoperatively, where contamination has occurred, grams ¼ Q 4 hours for two days intramuscularly are employed, and 300,000 I U penicillin in oil daily intramuscularly for that same period Sulfathiazole sodium is not used preoperatively but 2½ grams B I D is given postoperatively for 48 hours

Thirty six hours prior to surgery providing no obstructive element is present castor oil ounces 1½ is given followed in 24 hours by saline aspiration enemata until the return is clear To insure complete intubation a large size soft rubber tube is left within the lumen of the rectum An indwelling self retaining catheter is placed within the bladder which, preoperatively had been evaluated by cystometric studies[18] for bladder capacity and tonicity and by cystoscopy for the presence of an encroaching extra vesical lesion, and prostatic hypertrophy A weighted intestinal tube is passed to the stomach and this is connected to a Wangensteen suction It is continued in force during the operation and postoperatively until all signs of abdominal distention have abated (Table 3)

OPERATIVE CARE

The observation and care of the patient while in the operating room is of equal im*portance The choice of anesthesia at St* Mary's, Highland, Park Avenue and Monroe County hospitals Rochester, N Y, is continuous spinal or fractional anesthesia using one percent pontocaine in ten percent dextrose solution However, anesthetic agents selected depend on the anesthetist in relation to his particular findings in the individual case, and the needs of the surgeon

Care must be used in strapping the patient to the table Tight straps across the thighs, popliteal space or about the ankles is abso fat. To supplement this, 100 grams of Delcos Granules are mixed daily with feedings.

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Care must be used in strapping the patient to the table Tight straps across the thighs, popliteal space or about the ankles is abso lutely contraindicated because of danger of vascular injury and therefore, predisposition to venous thrombosis. Airfoam rubber is used to protect the soft parts from the strap. Trendelenberg operating position is preferred because it permits the small intestine to be cleared from the pelvic operative field without the forceful use of packs, surely an important factor in avoiding the formation of adhesions. Whole blood is always available and 1000 cc. are given as needed during the operative course. Continuous Wangensteen suction is maintained. Closure is always by figure-of-eight Jones type of closure and with Babcock No. 32 alloy steel wire. The low incident of skin infection reported[19] can be attributed in part to the use of wire.

POSTOPERATIVE CARE

Postoperative care unduly neglected may convert the most skillfully performed operation into a tragedy. Skilled nursing is imperative during this immediate postoperative period. High concentrations of oxygen whether by means of tent, dome or mask are given for 24 hours to reduce the amount of body nitrogen and thus avoid intestinal distention.[20, 21] Postoperative atelectasis should be watched for and measures immediately taken for its correction. If a bronchial plug is suspected, no time should be lost in aspirating the throat or performing bronchoscopy.

Passive, and later active movement of both lower and upper extremities is paramount to discourage venostasis. The lower extremities must be observed daily for tenderness together with unexplained pulse accelerations and apprehensiveness. Oftentimes the above may be the only indication of the formation of a silent venous thrombus. If it is suspected, no time is to be lost in placing the patient on heparin and bicumerol. Where a Miles' resection has been performed and a large residual perineal cavity is present, I am inclined toward immediate bilateral femoral ligation instead of antieoagulants.

FLUID BALANCE

[illegible] methods of determining the [illegible] are paramount. In [illegible] water balance, we [illegible] the patient's average post surgical daily intake, and balance this against loss of fluid by respiration, insensible loss through perspiration, kidneys, gastrointestinal tract (vomiting, diarrhea), intraperitoneally through Babcock sump drains, and Wangensteen suction.[21] Sufficient fluids to insure a urinary output of 1000 cc. is always a good norm to follow. However, necessary supplementary methods to determine water balance should be employed such as erythrocyte count, hemoglobin, hemotocrit, serum protein and chlorides.

Saline during the immediate postoperative period is avoided as salt is not tolerated well by the patient[22] especially in the presence of general body protein depletion. At first it should not exceed 500 cc. daily unless an excess amount is being lost by vomiting, diarrhea or draining areas. It has been my custom to immediately employ postoperatively ten percent dextrose in sterile distilled water, to allow fluids freely by mouth providing the Wangensteen suction is functioning, and water ounces one, Q one hour with the Wangensteen closed for 15 to 30 minutes. Gradually the patient is placed back on salt to 18 grams daily, this usually being supplied in the form of 1000 cc. of five percent dextrose in normal saline and in 1000 cc. amigens (a protein hydrolysate).

NITROGEN BALANCE

Just as an attempt was made to maintain the patient in positive nitrogen balance preoperatively, so it is just as necessary to maintain him in postoperative positive nitrogen balance. Since approximately 30 percent of patients with rectal and colonic cancer are hypoproteinemic,[24, 25, 26, 10, 22] and since it is an established fact that the postrectal cancer resected patients not only lose protein rapidly but do not even make it very well,[10] every effort must be made to supply adequate amounts. High protein reserves should be aspired to preoperatively. In my patients this is done postoperatively by means of the liberal use of small individual transfusions of whole blood, plasma and a hydrolysate. However, the earliest possible return to a high protein, low residue diet is the best means of maintaining nitrogen balance (Table 4).

It is timely to mention that when the Miles type of abdominal perineal resection or the

TABLE 4. EXAMPLE OF POSTOPERATIVE FLUID REGIMEN

FIRST DAY			
Dextrose, 10% in sterile distilled water			2500 cc.
Amigen, 5% in 0.9% NaCl solution			500 cc
Whole Blood			250 cc.
	TOTAL		3250 cc
SECOND DAY			
Glucose, 5% in 0.9% NaCl solution			1000 cc
Amigen, 5% in 0.9% NaCl solution			1000 cc
Whole Blood			500 cc
Sodium Lactate, 6 molar solution			500 cc
	TOTAL		3000 cc
VITAMINS IN FUSION			
Vitamin C, mgm. 1000			
Lye-B-C, ampules 1	Thiamine Hcl	100 mg	
	Riboflavin	10 mg	
	Pyridoxine Hcl	10 mg	
	Calcium Pantothenate	50 mg	
	Niacinamide	250 mg	
	Ascorbic Acid	200 mg	

abdominal perineal proctosigmoidectomy is performed, it is possible to begin postoperative oral feedings as soon as the colostomy clamp in the former is removed and/or when the patient has had his first bowel movement. In anterior resection with end-to-end anastomosis, on the other hand, the period of postoperative oral starvation is prolonged and the transition to a preoperative diet is gradual. The patient is then maintained on a low residue diet for approximately two weeks. Careful observation of protein, chlorides, CBC and hemoglobin must be made, and intravenous fluid therapy continued over a longer period.

URINARY BLADDER MANAGEMENT

Complications of the urinary tract postoperatively are rather frequent probably for several reasons and first become evident 48 to 72 hours postoperatively. A preganglionic sympathectomy is done in freeing the rectum from its pararectal attachments,[18] thus placing the bladder in a state of hypotonicity with increased spasm of the detrusor. Likewise the posterior wall of the bladder is left without anything to push against when contracting because of removal of the rectum. Another reason is the irritation caused at the trigone by the indwelling catheter, thus causing bladder spasm. To avoid complications the bladder is irrigated daily through the self retaining indwelling catheter with 1:4000 acriflavin solution and at no time is the bladder allowed to become over distended.

On the fifth postoperative day the catheter is removed and a urinary specimen is taken for laboratory study. Every eight hours the patient is catheterized for a residual urine. If over three ounces remains after 48 hours then the catheter is replaced. Often-times, especially after the Miles operation, it is necessary to send the patient home with a catheter in situ and even at times transurethral resection may be resorted to. In no cases following abdominal perineal proctosigmoidectomy at the Bacon Clinic was it necessary to resort to transurethral resection.

Variations occur in the technical postoperative management of the cancer-resected patient depending on the procedure followed. Where the Miles resection had been performed, the perineal pack is loosened on the second postoperative day coincident with removal of the colostomy clamp, and completely removed on the third and fourth postoperative days. It is our custom for seven days to irrigate the open perineal cavity daily with cod-liver oil and thereafter, with one percent ammonium bicarbonate solution. In the abdominal perineal proctosigmoidectomy, the perforated perineal drain is removed on the second day and the rectal tube on the event of the first bowel movement. In either case the duodenal tube is removed after the first bowel movement providing no abdominal distention is apparent.

Where anterior resection has been performed with immediate end-to-end anastomosis preceded by colostomy or cecostomy, the patient is orally starved. Nitrogen balance is maintained parenterally for three days, or until the patient is returned to a low residue diet. Sulfathalidine, two percent solution, ounces four is instilled into the distal colostomy daily. Instillation into the distal colostomy of ounces one of glycerin to ounces three of water is carried out and this usually effects a bowel movement within thirty minutes. In the two former operations, i.e. abdominal perineal proctosigmoidectomy and Miles, the patient is out of bed walking on the fifth postoperative day; in the latter, (Anterior Resection) on the first postoperative day.

COLOSTOMY CARE

It is not sufficient to carry the patient to an uneventful postoperative convalescence and then abandon him with a colostomy. As physicians and surgeons it is our duty to encourage, support, and instruct these patients so that they may be psychologically rehabilitated to a new way of life. On my service, the patients are instructed on colostomy care describing it in detail but in simple terminology. On the eighth postoperative day methods of irrigation are demonstrated, the patient gradually being taught his own care. Colostomy bags are best discouraged. W[illegible] the colostomy stump is too long, re[illegible] the colostomy is done by electric sna[illegible] days before hospital discharge.

RIASSUNTO

Le cifre riportate dall'Autore riass[illegible]
progressi realizzati nelle cliniche amer[illegible]
[illegible] ben predisposto piano di [illegible]
[illegible] Postopera[illegible]
[illegible] di questi carcin[illegible]
[illegible] lita', dell'oper[illegible]
lita' e delle percentuali di sopravvivenza. La preparazione degli ammalati si riassume nella ricerca di un equilibrio fisiologico e psichico. La funzione epatica va studiata preventivamente. Il successo operatorio dipende in gran parte dall'uso di sulfamilici non assorbibili e di streptomicina: dalla trasfusione di sangue totale: dall'uso di speciali fili di acciaio. La convalescenza dipende invece dal la conservazione del bilancio idrico e dell'azoto: da una precoce deambulazione: da una cura scrupolosa della colostomia.

SUMARIO

El autor discute el valor del plan sistematico en el tratamiento pre-operatorio, operatorio y post-operatorio del cancer del recto y colon pelvico, vajo el punto de vista de la mortalidad, resectabilidad y operabilidad de estos tumores. Las figuras presentadas son un indicio del progreso de las clinicas americanas. En el tratamiento pre-operatorio se debe de tratar de obtener el balance fisiologico y psicologico del paciente. Este debe de incluir la evaluacion de la funcion hepatica, el uso de las sulfonamidas de menos absorcion y la streptomicina. La transfucion de sangre y el uso de ciertas suturas de alhambre de acero contribuyen materialmente al exito de la operacion; mientras que la mantencion del equilibrio del nitrogeno proteico y del agua del paciente y el cuidado de la colostomia facilitan la convalesencia postoperatoria del paciente.

SOMMAIRE

Il importe d'observer attentivement les mesures préopératoires, opératoires et postopératoires à employer dans le traitement
chirurgical du carcin[illegible] du rectum et du
colon pelvien. Il f[illegible] er et considérer
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chiffres qui nous [illegible] rogrès mani-
[illegible]este obtenu dans le [illegible] ricaines. La
[illegible]éparation préopér[illegible] e demande
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[illegible]hologique aussi [illegible] mal que
[illegible]le. Il s'agit d'é[illegible] ions hé-
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[illegible]e sutures e[illegible] con-
[illegible]uccès opér[illegible] ir la

balance de l'eau et du nitrogène Il ne faut pas trop prolonger le séjour au lit Avec la colostomie, soignée intelligemment, on obtient une convalescence postopératoire satisfaisante

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Cystic Omental Bursa: Pseudopancreatic Cyst

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PSEUDOPANCREATIC cysts is a confused subject. Thirty years ago Besley[1] suggested that the entity be called a collection of fluid in the lesser peritoneal cavity resulting from trauma to the pancreas. Jordan Lloyd[2] who probably first recognized the true character of these tumors voiced this same opinion in 1898. Lately, Pinkham[3] has questioned the naming of these tumors and believes that they should be referred to as collections of fluids rather than "false" or "pseudo" cysts.

Despite the general acceptance of the qualitative definition as given by Besley, numerous contributions on the subject in the recent literature continue to classify these inclusions under pancreatic cysts.

The origin of the cyst is clear. Injury to the upper abdomen followed by a fluid mass pointing either between the stomach and liver, the stomach and transverse colon, or below the transverse colon, indisputably implicates trauma as a direct cause (Fig. 1). Moreover, the nature of the injury is so similar that a careful history-taking suggests a diagnosis. There is usually the story of having been rolled over by a vehicle, of having sustained a sudden sharp blow as from a baseball, or a kick in the upper abdomen; in time a cystic mass appears, but not necessarily with much subjective disturbance to the patient.

The sequence of events is as follows: there is a force sufficient to injure the peritoneum overlying the pancreas. The pancreas is crushed and blood and pancreatic secretions fill the lesser peritoneal sac. This is in conformity with the anatomic relationship of the pancreas to the lesser sac, and may be observed in the foregoing figure (Fig. 1). Inflammation sets in and a plastic exudate seals off the [illegible] of Winslow. If the now enclosed [illegible] continues to accumulate, the omental [illegible] distends beyond its normal limits pushing [illegible] adjacent structures until it [illegible] abdominal wall where it [illegible]

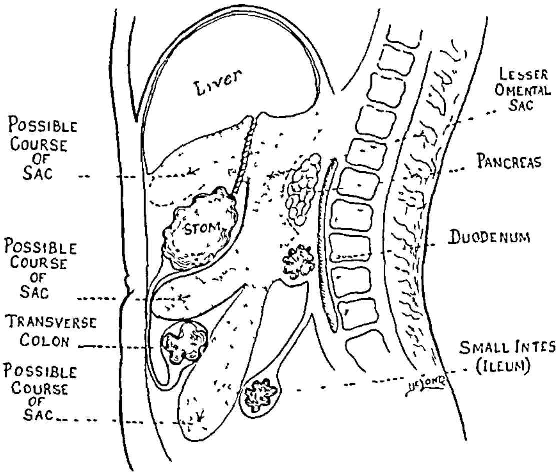

Fig. 1. Schematic drawing showing the anatomic relation of the lesser omental sac to pancreas and other organs. Finger-like projections show the possible courses which the cyst might take.

It is apparent that the pancreas may be involved only secondarily in the formative process. Hemic tumors without any direct pancreatic involvement are known. Consequently any causative force capable of producing the aforementioned steps may bring about a bursal swelling.

On the other hand, acute or chronic pancreatitis with hemorrhage, hemorrhagic necrosis, chronic interstitial pancreatitis, biliary diseases and carcinoma, all have been indicted as direct or indirect causes of cyst formation. In so-called "pseudo" cysts, they are contributing causes only inasmuch as they institute the trend of events sufficiently to wall off the lesser peritoneal cavity and cause it to distend beyond its boundaries.

To call these cysts pancreatic because fat-splitting, diastatic and proteolytic enzymes have been isolated in their fluid content is as illogical as to assert that a true pancreatic cyst must contain these ferments. Opie[4] has long ago shown that pancreatic enzymes have been found in fluids not in any way related to the pancreas and many true pancreatic cysts are completely void of all traces of pancreatic secretions.

Pedagogically at least it would seem consistent that these tumors belong to pathologic considerations of the lesser peritoneal sac

Despite the apparently intrinsic relationship of trauma to these cystic collections, it is not always possible to elicit a traumatic history A direct cause effect sequence as reported in the literature varies from 20 to 35 percent, depending upon the author and the series studied

In the following two cases, the patients were unable to recall even the most trivial injury in association with their illness The first awareness of a tumor came as a shock when they were informed of its presence by the examining physician Each patient had had pain in the epigastrium, some nausea, and gastrointestinal upset That a cyst could have reached the presenting size without the patient becoming aware seems incredible

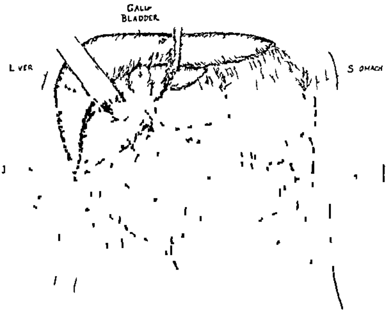

Fig 2 Artist's concept of appearance of tumor at operation

CASE REPORTS

Case 1 Female, white, age 42 She complained of fullness after meals epigastric pain, occasional nausea and idiosyncrasy to certain vegetables On examination a movable fluctuant mass was palpated in the epigastrium The mass filled the entire palm of the examiner's left hand There was no specific tenderness elicited and the patient appeared too well for a carcinomatous growth of such magnitude Furthermore roentgenograms demonstrated the consistency of the tumor and its extra alimentary tract location Moreover, all laboratory tests referable to the pancreas and biliary system were negative The diagnosis of a so called 'pseudo' pancreatic cyst could not be excluded Surgery was apparent The patient, however, was stunned on hearing her plight, and consulted several other surgeons before submitting to operation

Through an upper left paramedian incision, a large cystic mass was found between the stomach and the transverse colon pushing the stomach upward and to the left (Fig 2) On incising the cyst, approximately three quarts of a peculiarly brown grey fluid were obtained, and at least a quart of a black grey paste was scooped up from the base of the cyst Further investigation revealed that it had two compartments, and on removing the putty like substance from the second sac, an underlying vessel was injured, causing a distressing hemorrhage which filled the cavity and required careful packing with iodoform gauze before it could be arrested Marsupialization of the sac was followed by a rugged postoperative course because of hemorrhage Six months later the patient had completely recovered, and all drainage from the sinus had stopped

Case 2 Female, colored, age 54 The patient was seized with severe epigastric pain which radiated to the left kidney area There was some nausea but no vomiting Examination revealed a mass in the *left hypochondrium A kidney tumor was suspected*, but an intravenous pyelogram showed a normal kidney There was however a definite ovoid mass (Figs 3, 4), compressing the stomach A diagnosis of splenomegaly was given by the radiologist, and the patient, apparently getting worse, was subjected to laparotomy

After opening the abdomen, a retroperitoneal tumor was suspected, but it was soon apparent that

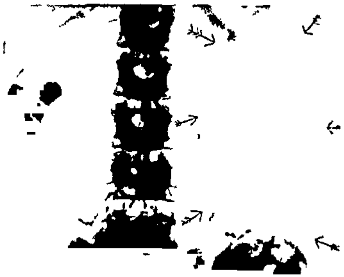

Fig 3 X ray view of so called "pseudo" pancreatic cyst, anterior aspect, tumor originally considered an enlarged [illegible]

the presenting cyst was of the so-called "pseudo" pancreatic type. The cyst was marsupialized after several quarts of a straw-colored fluid had been withdrawn and recovery ensued in six weeks' time.

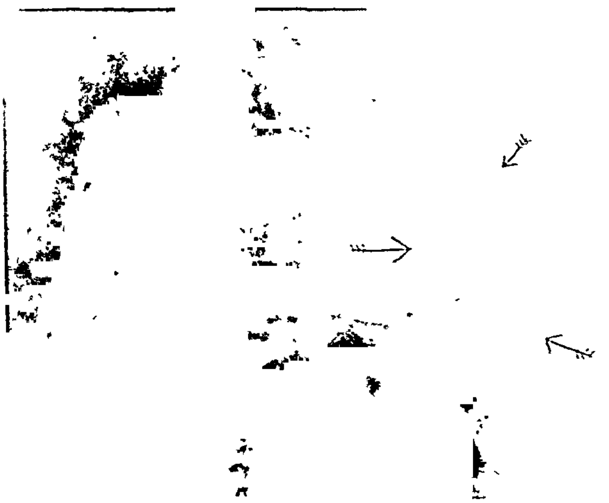

Fig. 4. X ray view of so-called "pseudo" pancreatic cyst, posterior aspect.

DISCUSSION

Although complete surgical extirpation is the ideal treatment for these cysts it is seldom possible to employ this method because of hazard to the surrounding structures and technical difficulties encountered. Marsupialization is the accepted practical manner of surgically dealing with them. Drainage from the sinus may seem interminable at times, and in order to eradicate the fistula, resort to various sclerosing agents has been done. These include roentgen ray, radium, various mechanical and chemical agents, the effects of which are equally varied. Tincture of iodine, silver nitrate, and sodium salicylate solutions probably have been the most common agents employed. Recently frequent instillation of from 5 to 30 cc. acetone (20 percent to undiluted) has been suggested by Walker,[3] who believes it is more effective than any other substance. The solution is introduced by catheter [illegible] the marsupialization fistula and healing [illegible] ...ally promoted.

[illegible] drainage by anastomosing the cyst [illegible] duodenum, jejunum, or gall [illegible] ...ssfully accomplished. [illegible] proposed this method by [illegible]. Since that time the same principle has been adopted by different surgeons and different organs employed. But despite the number of reported successes the operation appears more as a surgical feat than of any practical advantage to the patient.

SUMMARY

1. Because of the anatomic features in the formation of so-called pseudopancreatic cysts, it is suggested that these cysts be referred to as fluid collections of a pathologic lesser peritoneal sac, particularly inasmuch as the pancreas may have only a remote cause-effect relationship.

2. It is believed that proper pathologic consideration should be given the omental bursa, and that the phrase "cystic omental bursa" may satisfactorily designate the disease entity.

3. Two new cases are presented and their operative correction is discussed.

4. Attention is directed to the use of acetone solution as an obliterating medium in hastening the closure of the marsupialization fistula.

RIASSUNTO

1. In base agli aspetti anatomici delle così dette cisti pseudopancreatiche e piu' specialmente ai rapporti patogenetici molto remoti con il pancreas, l'A. designa queste cisti quali *raccolte fluide della piccola cavita' peritoneale.*

2. Una speciale considerazione va attribuita alla borsa omentale. Il termine di borsa cistica omentale designa bene l'entita' morbosa.

3. Illustra due casi del genere, discutendo la cura operativa.

4. Richiama l'attenzione sopra l'uso di una soluzione di acetone onde obliterare piu' rapidamente la fistola residuante alla marsupializzazione.

SUMARIO

1. Los mecanismos anatomicos que contribuyen a la formacion de los quistes seudopancreaticos hacen que el autor sujiera su denominacion de colecciones fluidicas patologicas del saco peritoneal menor, especialmente cuando el pancreas tiene relaciones remotas con ellos bajo el punto de vista de causa y efecto.

2 Se cree que se debe de considerar en la patologia de estas colecciones a la bolsa omental y por lo tanto la designacion de "bolsa omental quistica" es mas satisfactoria en la terminologia de esta entidad patologica

3 Se han presentado dos casos nuevos y se discute la tecnica operatoria para su correccion

4 Se dirige la atencion al uso de la solucion de acetona como medio obliterante de la fistula marzupializante en estos casos

SOMMAIRE

1 Vus les caracteres anatomiques determinant la formation de ces kystes designés pseudopancreatiques, il est suggere que ces kystes soient envisages comme des collections liquides d'un sac peritoneal pathologique, surtout parce qu'apparemment le pancréas ne joue qu'un role secondaire de causes ou d'effets à leurs egards

2 L'auteur suggere qu'on donne une consideration adequate aux bourses épiploiques et que la phrase bourse cystique omentale, désigne la maladie entiere

3 L'auteur presente deux cas et discute leur correction opératoire

4 L'auteur attire l'attention sur l'emploi de solutions d'acétone pour hâter l'oblitération des fistules consécutives a la marsupialisation

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Surgical Correction of Senescent Pendulous Cheeks

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THE DESIRE to look younger is entirely logical, human, and often is an economic and psychologic necessity.

Rhytidectomy is first credited to Gersuny (1899). Later, operations devised by Lexer (1906), Hollander (1912), Passot (1919) and Joseph (1921) were reported. Until today, their much modified technics are considered acceptable surgical procedures.

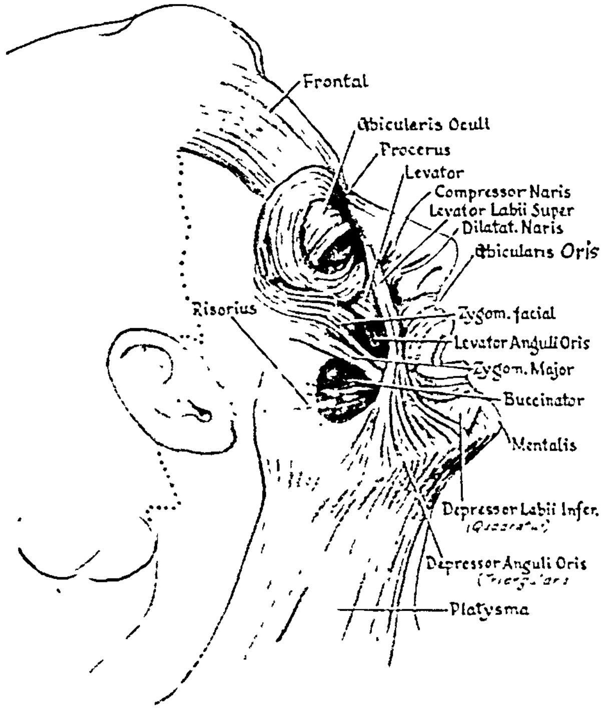

Fig. 1. Muscles of the face.

In operations designed for the obliteration of the effects of facial senescence the surgeon's plan for the correction must consider several [illegible] facial areas

1. The forehead
2. The glabella.
3. The upper lid.
4. [illegible]
5. [illegible]

In carrying out the surgical correction the glabella is generally corrected with the forehead, the upper and lower eyelids are generally corrected together, and the cheeks and the neck are generally corrected in one operation. This paper is concerned with the cheeks and neck.

The etiology of premature facial senescence must be understood before surgical intervention is attempted. The facial contour is normally guaranteed fixedness and integrity by three broad rings of muscles. Two are the orbicularis oculae encircling the eyes. The third is the orbicularis oris, the thin band of muscle stretched around the mouth. All three muscle bands are held in balance with each other by the attachments of the other facial

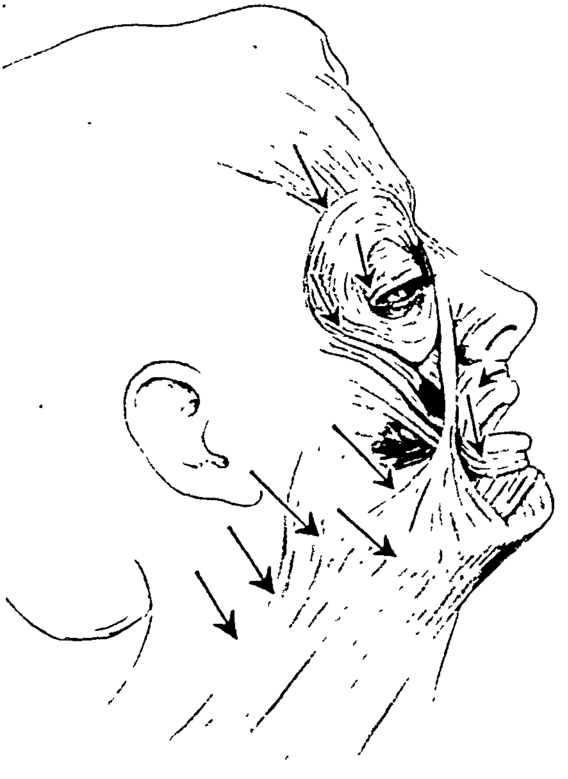

Fig. 2. Direction of travel of facial skin causing pendulous cheeks.

[illegible]

muscles, by their interplay, keeping them all in proper tonal balance.

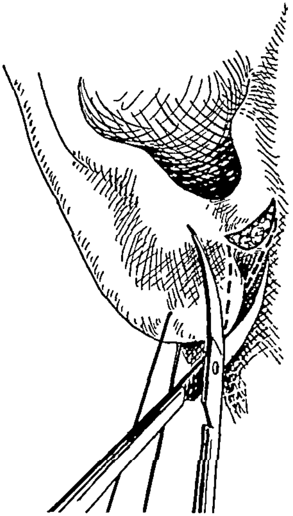

Fig 3. Triangular crescent excised from anterior lobular edge to exaggerate acute lobular angle.

Another factor in the etiology of facial *senescence is the atrophy or hypertrophy of* the skin as age advances. As youth disappears an atrophy of the subcutaneous areolar tissue and of the glandular elements of the skin occurs. Simultaneously there is a diminution of muscle volume of the facial musculature.

Further, in considering the anatomy of facial senescence one must divide the face into three areas of vertical dimension. The first is the space from the hair line to the glabella, the second is from the glabella to the nasal *columella and the third or lowest vertical* dimension is from the columella to the inferior surface of the chin. It is in the lower third of the three vertical dimensions of the face where the advancement of age is most graphically made evident

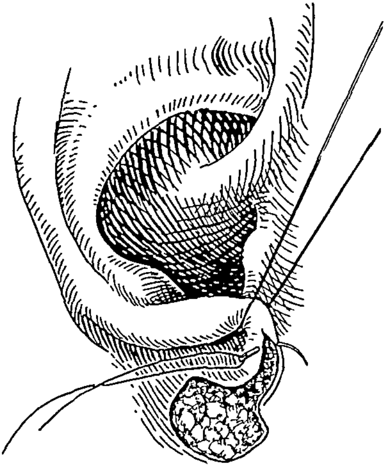

Fig. 4. Lobular incision sutured insuring postoperative lobular integrity.

As age approaches a few teeth are lost. The remaining molars are ground down by mastication and well known dental phenomena occur. There is some absorption and diminution of the size of the mandible and the anterior upper and lower incisor teeth tend to deviate their occlusal surfaces anteriorly. *Thus there is loss of vertical dimension of* the lower third of the face.

With these anatomical changes the masseter muscle loses tone, and the loss of vertical dimension plus the atrophy of the subareolar connective tissue results in the accentuation of the nasolabial fold and the skin of the cheek becomes pendulous.

The zygomatic major muscle which is attached to the lateral corner of the orbicularis oris loses length and mobility. As it becomes *more fixed it causes characteristic folds near* the mouth. The platysma muscle loses tone and becomes more fibrous and the skin below the chin may "double," if the person is fat, or become redundant, if the individual is thin.

The amount of skin to be removed is best

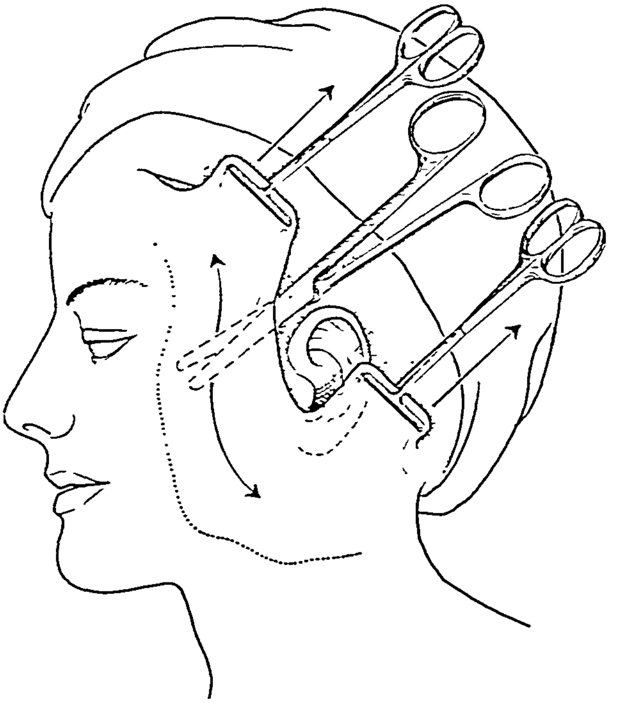

Fig. 5. Undercutting above fascia while skin is rotated posteriorly and superiorly. Arrows indicate direction of traction.

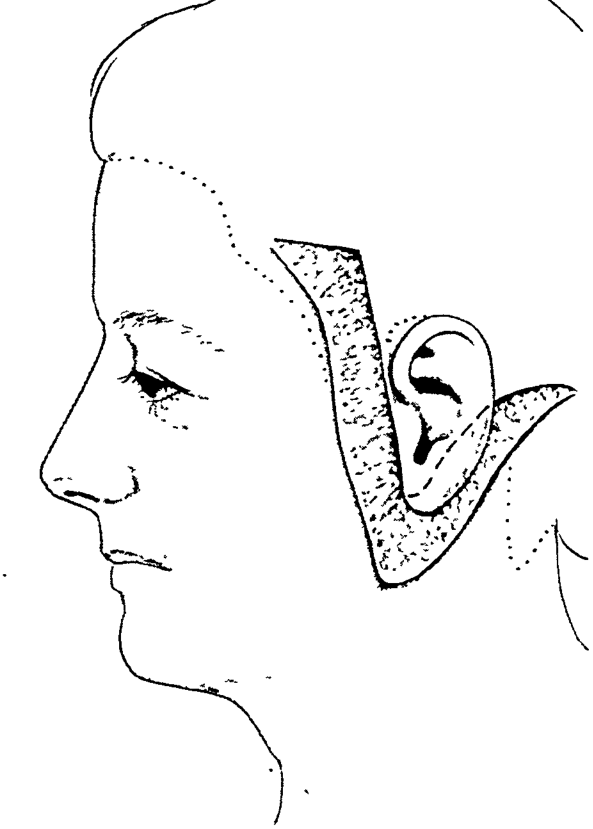

Fig. 6. Incision to correct pendulous cheeks.

judged with the patient in the upright position. The skin of the cheeks is drawn backward and upward with the fingers, and the appropriate areas for excision are marked with a dye. If the skin is drawn too tightly, the nasolabial fold is entirely obliterated. This tautness lends a distorted appearance to the mouth.

The incisions are made inconspicuous by concealing them as much as possible in the hairline. The incisions of the angle of the ear are concealed by the overhanging ear lobe.

The patient's hair is shaved in the temporal area and behind the ears. A wide strip of adhesive bandage is laid along the surgical border so that the hair does not intrude into the surgical field. The face and adhesive strips are painted with a mercurous antiseptic.

The surgery is conducted with a one per- [illegible] with adrenalin anesthetic. The [illegible] the ear lobe, then fol- [illegible] From this [illegible] anteriorly to- [illegible] nasolabial [illegible] ly of the mandible and along the sternocleidomastoid for several inches.

A triangular section of the ear lobule is excised as illustrated, and the lobe resutured. This is to accent the curvature of the ear lobe against the slight tension to which it will be opposed later. The incision is then carried upward along the anterior edge of the auricle and into the hair area and forward and upward into the temporal area. The posterior limb of the incision passes under and posterior to the ear, in the postauricular sulcus. It passes into the hair line above the level of the tragus.

The margins of the skin to be resected are grasped with forceps along the entire incision. Lahey, Allis or Kocher forceps or towel clips may be used. The skin is undermined as extensively as the particular need indicates. Generally the undermining is carried near

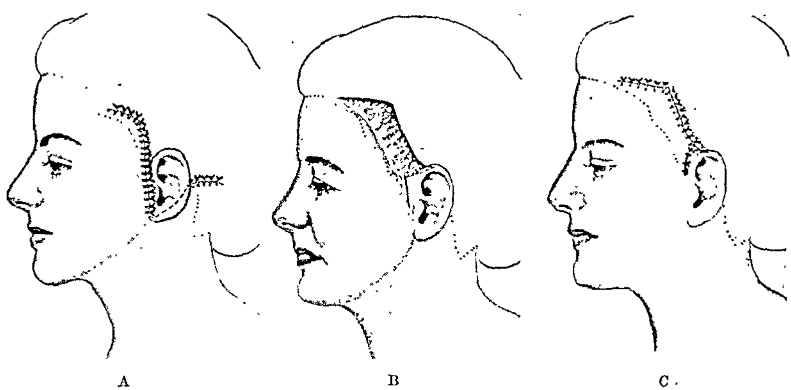

Fig. 7 A. Closure of temporal and circumauricular incisions. B. Temporal (Ehrenfeld) incision for pendulous cheeks suitable for early rhytidectomy, especially when teeth have lost no vertical dimension and pendulousness is limited to upper cheek. C. Closure of temporal incision.

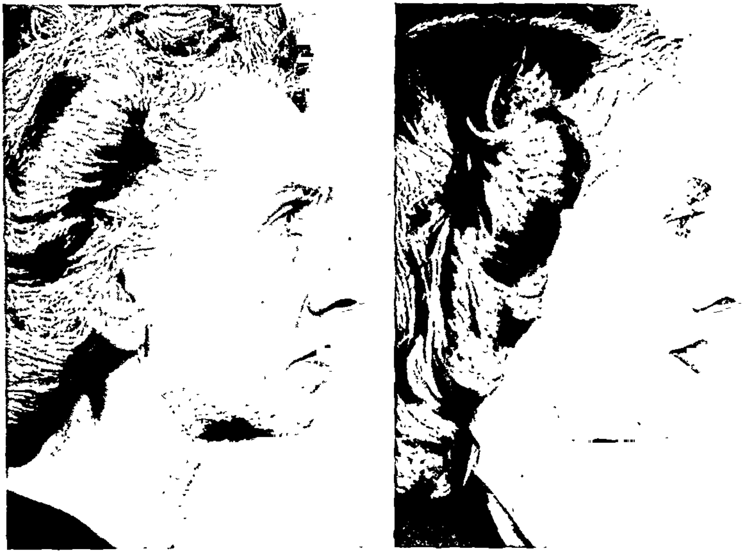

Fig. 8. Left. Pendulous cheeks before nasal plastic correction and bilateral rhytidectomy. Right. Profile view after nasal correction and bilateral rhytidectomy.

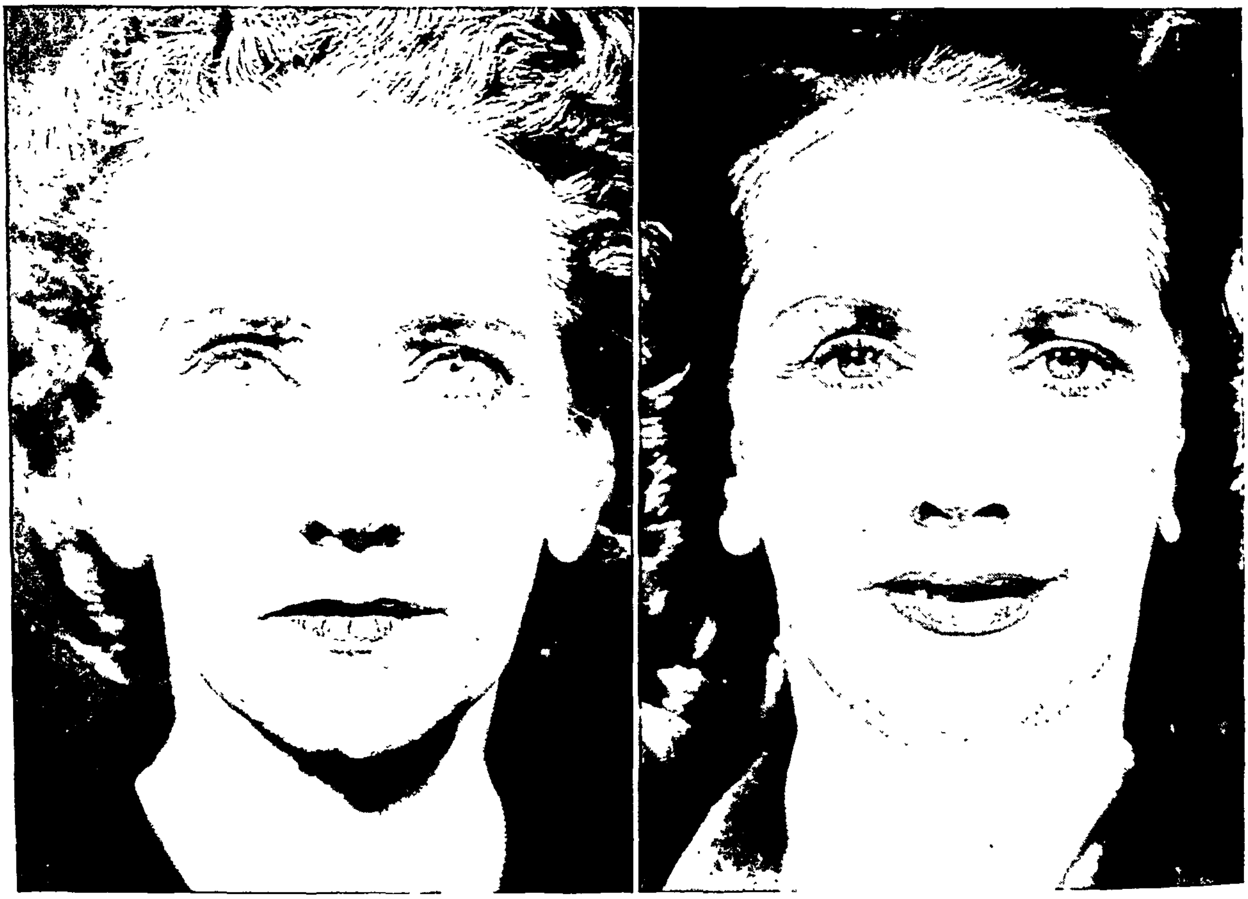

Fig. 9. Left. Front view before surgery. Right. Front view after surgery.

to the outer canthus, the undermining radiating to the nasolabial fold and over the sternocleidomastoid. The undermining operation is confined above the fascia.

By protecting the fascia, the temporal branches of the facial artery, nerve, and vein are uninjured. Further, the fixation or anchor sutures are more effective with an undisturbed fascia.

The anchor sutures are placed as follows:

1. Canthus area toward temporal area.
2. Nasolabial area toward the auricle.
3. From along the body of the mandible toward the ear lobe.
4. From along the sternocleidomastoid area toward the postauricular sulcus.

[illegible] chromic catgut for an- [illegible] and cotton [illegible]

Once the fixation of the fascia is completed, the forceps are pulled upward and backward, drawing the skin over the ear, until the face is smooth, but not artificially taut.

With the skin now repositioned, being literally rotated upward in the direction of the temporal area, and backward toward the auricle, the resection may proceed. While the skin is held in its new position with the forceps, under tension, the excess skin is trimmed away with scissors. The excision is most wisely begun at the critical lobule area. It proceeds forward up toward the temporal area, then posteriorly along the postauricular sulcus.

After four or five lineal cm. are excised, the suturing of the skin should commence, beginning at the lobule. As the first few centimeters are sutured anteriorly along the auricle, the excision is extended ahead of the skin sutures, preceding it as the suturing progresses. Skin closure may be with fine sutures,

Fig. 2[illegible]

[illegible]

[illegible]

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Two Surgical Days in Vienna, Austria

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Pentothal Sodium Anesthesia in Major Surgery

Application, Administration, Dosage

D L RATER, MD, FACS, FICS
OTTUMWA, IA

PENTOTHAL sodium anesthesia, while by no means unfamiliar today to most surgeons, is still new enough that there may be many who would welcome the opportunity to learn more of its use than their own experience shall have taught them, together with some data regarding routine procedures and precautions to be observed when using it There is also in some quarters, insufficient knowledge of certain other medicaments that may, or in some instances must, be used in connection with it It is the purpose of this paper to cover some of these points

Two persons are chiefly concerned with any anesthetic—the surgeon and the patient The surgeon seeks an anesthetic material which will give prompt and complete relaxation without undesirable side effects and without postoperative nausea or toxicity The patient desires freedom from the sensation of suffocating while "going under' and from the postoperative misery so familiar until very recent years to everyone who underwent major surgery Pentothal sodium anesthesia has earned the reputation of being this sort of anesthetic material Surgeons who have used it, find it fulfills their most exacting requirements in all forms of surgical procedures, including Cesarean section Patients who have experienced it, or who know other persons who have done so, often specifically request it

For nearly three years, I personally have used pentothal sodium anesthesia exclusively for all my major surgical operations, as well as for many minor ones Used either alone or, upon occasion in conjunction with curare (intocostrin), it has been found to give rapid, adequate anesthesia and relaxation during operation, and to reduce materially the hazards and difficulties of the postoperative period, allowing as it does much earlier resumption of normal feeding thereby reducing to a minimum dehydration and intoxication during early convalescence Approximately 92 per cent of the patients operated upon during this period experienced *no* postoperative nausea or vomiting

However, as with any anesthetic material, pentothal sodium must be thoroughly understood by both the surgeon and the anesthetist, both in order to make full use of its possibilities and to avoid its dangers Especially is this true when other medicaments are to be used with it Such medicaments include curare, coramine, metrazol, adrenal cortex extract, picrotoxin and, less frequently, the sulphates of caffeine and ephedrine The application of these adjuvants and their properties will be discussed farther on in this paper

PREOPERATIVE ROUTINE

Except when emergency makes it impossible, it is most desirable that the patient be admitted to the hospital far enough before the scheduled time for operation to permit not only adequate physical and mental preparation of the patient himself, but also for full and complete history and observation, as well as physical, laboratory, and where indicated, roentgenographic, examinations This is especially important in the case of elderly or very young patients, the debilitated, anemic, diabetic, cardiac and other poor risk patients, or those who, for any conceivable reason, might be capable of precipitating any sort of crisis in the operating room or after

Where dictated by the results of examination, every means must be used to bring the patient to the best possible condition before subjecting him to surgery Bed rest, administration of extra fluids, attention to elimination, administration of vitamins, whole blood, intravenous glucose (five or ten percent in normal saline), drolan, amino acids liver extract, etc, all assist greatly under various circumstances, to this end If there is a tendency to flatulence, only fluid should be given for twenty hours before surgery, with nothing by mouth after midnight Except where ap pendicitis is suspected, a saline laxative such as phospho-soda fleet, two tablespoons in eight oz. warm water, may be given at 4 P.M., repeating at 10 P.M. if necessary. A warm enema of normal saline may be given three hours before the scheduled time for operation. If there is evidence of persistent flatus after this, one ampoule prostigmin, 1/2000, may be given one hour later, repeating in an hour if needed. A colon tube or dumbbell may also be of assistance to the nervous patient.

Seconal, grs. 1.5, or some similar preparation, should be given at bedtime, the night before operation, to allay restlessness or anxiety. One hour before operation, morphine sulphate, gr. 1/6, with atropine sulphate, gr. 1/150, should be administered routinely, except in the case of women undergoing Cesarean section. In these latter, as well as in the very young, the aged and those markedly debilitated, the effects of morphine and atrophine are prohibitively depressing to respiration. Other drugs and evacuants also may be used, routine caution, of course, being exercised in their application.

Patients thus prepared, come to the operating table with a flat abdomen, free of all gaseous distention and without the dangers of trauma to the viscera and of shock that otherwise might so easily prejudice their convalescence.

ANESTHETIC TECHNIC

Necessary Equipment:

1. Gas machine (calibration allows administration of known quantity of oxygen at all times.

2. Sterile towels.

3. Ethyl alcohol, sterile cotton, gauze pads.

4. 20 gauge needles, 3 or more.

5. Arm board (well padded, preferably attached to table).

6. Rubber tubing: 2 lengths, one 6 inches, one 30 inches long.

7. Vaco-drip, Baxter Murphy drip bulb.

8. Screw-controlled clamp.

9. [illegible]

10. Airways, 1 oral, 1 nasal, 1 tracheal.

11. Glass observation tube, beveled to fit [illegible]

12. [illegible]

13. Tongue clamp.

14. Syringes with 18-gauge needle, 1 20-cc., 1 30-cc.

15. Flask normal saline (triple-distilled water).

16. Salvarsan flask, graduated, 500 cc.

17. Pentothal sodium powder, 1-gr. ampoules.

18. File.

19. Hemostat.

20. Metrazol, coramine, adrenalin chloride, adrenal cortex, picrotoxin, prostigmin, curare, etc. (sufficient quantities for emergency use).

21. Adjustable standard with two holders (for administration of solutions or of blood).

The mechanism for administering the anesthetic is made-up in the following manner:

Suspend the salvarsan tube from one arm of the standard by a strip of gauze bandage. To this attach successively the six inch length of tubing with the screw-clamp affixed, the vaco-drip Baxter Murphy drip bulb, the 30-inch length of tubing, the bevelled observation tube and a 20-gauge needle. Cover the mouth of the salvarsan tube with sterile gauze.

To prepare the pentothal sodium solution for use (all procedures being executed under complete asepsis), file an ampoule (1 gr.) of the powder at the base of the neck of the tube. Sterilize the upper half of the ampoule in alcohol and remove the top in the usual manner. Add enough normal saline solution to dissolve the powder with a little stirring; or place the powder in a wine glass and dissolve in a like manner. (The use of saline prevents hemolysis.)

Partially fill the salvarsan tube with saline solution and allow all air bubbles to escape from the entire linkage below the tube. Add the prepared pentothal sodium solution and add enough more saline to make 100 cc. This reduces the strength of the solution to one percent—the desired concentration for starting the anesthesia.

Administration: With the patient comfortably placed on the operating table, blankets properly secured and the blood pressure bag in position on the right arm, the forearm is placed in a padded arm-holder on the side of the table. A padded arm board is attached to the left side of the table perpendicularly, with the patient's arm snugly secured to it by a five foot length of four inch wide muslin A loop of the muslin is placed over the wrist and drawn snug the loose ends being passed down over the arm board, opposite to each other, brought up over the palm of the hand and tied In individual cases the general procedure sometimes needs to be altered, the point to be borne in mind is that the flexor surface of the arm should be upward, the arm being firmly fixed and comfortable, as well as convenient for the anesthetist to undertake

Venipuncture This is usually made into the *vena mediana cubiti* although any prominent vein will serve In some instances, where all the veins of the arm are small or cannot be located, a vein in the foot or lower leg may have to be substituted, in which case the procedure indicated in the preceding paragraph will, naturally, have to be altered to fit individual need

A tourniquet is slipped around the left arm just above the elbow and the veins allowed to distend by the usual means The area over the chosen vein is cleansed with alcohol and the needle inserted When back pressure of blood is noted in the observation tube, the tourniquet is loosened and the anesthetic solution allowed to flow It is wise to turn the long side of the needle to parallel the intima of the vein (the bevel being toward its center) to allow unobstructed flow of the solution

In some cases, it may become necessary to make a "blind" venipuncture, which, if the anesthetist knows his anatomy will not prove too difficult The only danger is that of entering an artery instead of a vein Arterial pressure would make it impractical to attempt to administer an anesthetic by this route

Having established satisfactory flow into the vein, the screw clamp is adjusted to allow a flow of approximately 60 drops per minute of the anesthetic solution This rate of flow is allowed to continue for about two minutes or until all reflexes have disappeared, with close observation centered on the patient Stroking the eyelashes or pulling the tongue forward and inserting a tongue blade into the pharynx, are useful tests for this purpose

In certain poor risk patients, the elderly, the very young, the debilitated or in extremely nervous persons, more time will generally be required to attain the necessary depth of anesthesia Metabolism must be carefully considered in such patients While some will do perfectly well on the usual rate of 60 drops per minute, in others this should be reduced to 45 drops per minute or less This again is a matter which only thorough knowledge and long experience on the part of the anesthetist may dictate

As soon as all reflexes have disappeared a tracheal tube may be inserted to assure smooth breathing, or the airway may be placed through the mouth or the nares into the pharynx *Free and unobstructed breathing at all times is an absolute necessity*

An oxygen mask is now secured in place and oxygen allowed to flow at from 300 to 500 cc per minute, depending upon individual requirements While this is being done the patient is draped, the operative site prepared and the surgeon is ready to make his first incision If the patient shows no reaction to this latter manoeuvre, the flow of anesthetic may now be reduced to 45 drops ($\frac{3}{4}$ of one percent), 30 drops ($\frac{1}{2}$ of one percent) or 15 drops ($\frac{1}{4}$ of one percent) per minute depending upon the demands of the individual for maintenance of adequate anesthesia

During the course of the operation, the amount of respiratory depression serves the anesthetist as an accurate guide to the depth of the anesthesia Too high concentrations can cause complete cessation of breathing and bring about speedy death

Should the patient cease to breathe, artificial respiration, together with the administration of additional oxygen and cardiorespiratory stimulants, must be instituted at once Even when a patient appears deeply cyanotic, and breathing has ceased, the heart continues to beat for a certain length of time, often a few strong deep, regularly spaced compressions of the chest are all that will be needed to reestablish normal respiration

If the patient does not respond *promptly*, one or all three of the following drugs, coramine, metrazol or picrotoxin, should be administered For experiments upon animals as well as in certain cases of operating room crises reported in recent literature, give evidence that a delay in reestablishing respiration of no more than two or three minutes may cause permanent injury, while five minutes or more mean nearly certain death.

Intravenous pentothal sodium has been shown to have little or no effect upon the action of a normal heart. However, there is definite danger if cardiac decompensation be present, the danger being proportionate to the degree of disability. The patient's blood pressure normally falls as soon as a small dose of pentothal sodium is given, but soon returns to normal. After the anesthetic has been in progress for several minutes, vasodilation occurs together with a rise in the temperature of the extremities.

The appended table, representing cases chosen at random from my surgical practice, gives a fair cross-section of the ages of patients, the length and type of operations and other pertinent data, in connection with which pentothal sodium anesthesia was used. (Table 1.)

ADJUVANTS

Curare: This drug is prepared from an extract of *chondodendron tomentosum*, a crude preparation of which was first used by South American Indians for hunting wild game and stalking their enemies from ambush. It was first introduced in 1942 as an adjuvant in anesthesia to produce controlled degrees of relaxation needed by surgeons. Muscular relaxation is often a prime requisite to a successful operation. To attempt to obtain it by increasing the depth of anesthesia alone may endanger the patient's life, or, at the least, provoke additional postoperative complications.

Adequate preoperative preparation can usually eliminate this complication, but in cases of emergency, where time is at a premium, a drug to produce relaxation without dangerously deepening anesthesia, is often needed. Such a drug is curare.

In the usual dosages the effect of curare is [illegible] skeletal muscles peripherally. The [illegible] head and neck are the first to [illegible] of the abdomen, then [illegible] the diaphragm. It [illegible] its use so valuable. [illegible] of respiration [illegible] relax- [illegible] without respiratory embarrassment. It is not an analgesic; it simply produces relaxation.

I do not use curare routinely, although many capable surgeons do. Where it is needed for the average patient, an initial dose of 60 units, given either intravenously or intramuscularly, usually serves. In toxic, debilitated or other poor risk patients, the initial dose should be no more than 20 units (1 cc.). In extremely lengthy operations, supplementary injections of one or two cc. may be needed to maintain the desired degree of relaxation.

When curare is being used, the amplitude, rate and character of the respiration must be observed with great care, as overdosage will show up immediately in the breathing. Should the patient show any signs of being overcome, prostigmine, 1/2000 should be administered in one or two cc. doses.

When used in conjunction with pentothal sodium anesthesia, the amount of anesthetic required is somewhat reduced. This in turn, means that the patient wakens after surgery, even more promptly, often in from 15 to 20 minutes.

Coramine: (pridine-beta-carboxylic acid and diethylamide). This drug is a proven cardiac, central nervous system and respiratory stimulant. Therapeutically, it is a specific in nicotinic acid deficiencies such as pellagra. As a peripheral stimulant, coramine acts directly upon the heart, lungs, respiration, circulation and muscle tone. It is mediated through the medullary centers in the central nervous system. Increased respiratory volume will be noted approximately 20 seconds after parenteral injection, particularly when respiratory depression has been produced by morphine sulphate.

Coramine increases the blood pressure and produces dilation of the coronary vessels. When administered intravenously, it increases muscular pressure and restores intravenous pressure in shock or massive hemorrhage. Its toxicity is low, it shortens narcosis.

When needed, it may be given in three to five cc. doses, in respiratory paralysis, an initial dose of 10 or 15 cc. is given immediately, followed by other methods of resuscitation.

Metrazol: (pentamethylenetrazol-$C_6H_{10}N_4$). This drug is a white, tasteless, crystalline, neutral, stable substance, readily soluble in water It is a respiratory and circulatory stimulant It may be used in conjunction with other cardiac drugs It is used in sudden circulatory failure and cardiovascular collapse, also to sustain circulation in chronic cardiac insufficiency, *in depression due to infectious* diseases, in shock, asphyxia neonatorum and in depression due to other drugs It may be given with ephedrine or digitalis It increases the depth and rate of respiration, but does not have the exciting effect of caffeine It increases the exchange of CO_2 and oxygen in the lungs, thus improving pulmonary ventilation with consequent immediate improvement of the patient's condition

One ampule should be administered when needed, the dose may be repeated in one half to two hours without cumulative effect Administration must be slow so as to avoid the production of convulsions

Adrenal Cortex Extract Containing the cortical elements of the adrenal glands which are essential to life, adrenal cortex extract maintains electrolytic and fluid balance between the circulating blood and the tissues, and assists carbohydrate metabolism Also stabilizing blood pressure and restoring blood volume to normal levels, it serves as a buffer in surgical procedures, against shock, physical injuries and nervous excitement Given in physiologic doses, the normal renal threshold for urea, potassium and sodium with resulting decrease in non protein nitrogen and potassium and increase in blood sodium is restored Its use is specifically indicated in Addison's disease, with these patients, its use is imperative, *as otherwise they are very poor surgical* risks

It is supplied in 10 cc rubber capped, sterile vials, to be administered intravenously, intramuscularly or subcutaneously The dosage is governed by the clinical response, the initial dose is 1 or 2 cc During a crisis the dosage may sometimes be increased to as much as 40 or 50 cc It should be included routinely in any intravenous fluids given postoperatively

Picrotoxin This is indicated in barbiturate poisoning It stimulates the central nervous system, if given in excessive doses, it will produce convulsions As an antidote to the barbiturates, it is nearly perfect, each successfully counteracting the fatal effects of the other—1 cc represents 3 mg of the drug The initial dose should be 2 cc, given intravenously Should the response be unsatisfactory after 15 minutes, a second dose of 3 or 4 cc may be given, *however, an additional dose is only* rarely necessary

If, through some error in judgment, the patient is found to have received an overdose—as evidenced by muscular reaction—1½ to 3 gr pentobarbital sodium should be given as an antidote

Other medicaments which may be needed with pentothal sodium anesthesia include ephedrine sulphate, which may be given in doses of ⅜ gr (0 025 Gm) to elevate blood pressure, and caffeine sodium benzoate which is given in 7½ gr (0 05 Gm) doses as a stimulant

SPECIAL PRECAUTIONS

In conclusion, there are certain points which require special emphasis, even at the risk of reiteration Before any patient is subjected to an anesthetic and major surgery, it is imperative that both surgeon and anesthetist have the fullest possible knowledge of everything in his circumstances that might possibly have any *bearing on his well-being during* and following the operative procedure That this seemingly self evident truth should need repeating is amply borne out by the case records of even some of our finest hospitals

Obtaining such knowledge begins of course with the history and the routine examinations Points of especial importance are [illegible] patient's *age, his state of nutrition, debility, obesity* if present, the complete blood picture, the state of function of the heart and kidneys, and the presence or history of toxemia, excessive nervousness (look into its causes) alcoholism The metabolic status of the patient should be known

The patient's mental attitude toward his own prospects, and especially his outlook on the anesthetic are especially important If he is pessimistic towards his prospects of survival, he will be a poorer anesthetic risk, and everything possible must be done to improve his outlook and gain his confidence In extreme cases, it is not too much to say that the risk

TABLE 1.

Patient	Sex	Age	Nature of Operation	Length of Operation	Blood Pressure (Systolic)	Pulse
F. H.	M	61	Ureterolithotomy	77 min.	High—140 Low —132	High—88 Low —45
S. M. B.	M	76	Colostomy	82 min.	High—162 Low —151	High—109 Low —98
E. V.	F	56	Cholecystectomy, appendectomy	60 min.	High—132 Low —114	High—88 Low —78
G. S.	M	7	Appendectomy	42 min.	High—142 Low —127	High—93 Low —82
B. L.	M	14	Appendectomy	32 min.	Steady at 121	High—134 Low —126
M. C.	F	29	Total Hysterectomy	90 min.	High—132 Low —112	High—82 Low —64
F. S.	M	82	Prostatectomy	49 min.	High—122 Low —102	High—82 Low —64
M. C.	F	85	Gastroenterostomy	92 min.	High—151 Low —122	High—102 Low —84
A. M. N.	F	69	Postoperative Strangulated Ventral Hernia, Strangulated Femoral Hernia	137 min.	High—160 Low —150	High—82 Low —64
L. R.	F	39	Cesarean Section	64 min.	High—130 Low —121	High—82 Low —63
A. D.	F	40	Thyroidectomy	72 min.	High—151 Low —121	High—93 Low —74
F. M.	M	6	Sebaceous Cyst	36 min.	High—130 Low —120	High—98 Low —82

TABLE 1 —*Continued*

Resp	Pentothal Sodium Concentration in %	Adjuvants		Remarks
		Drug	Amount	
Steady at 18	1% throughout	Corimine Adrenal Cortex Metrazol	 3 cc 2 cc	Pulse rate rose steadily throughout procedure, B P fell, rose and fell again
High—22 Low —14	1½% throughout	Corimine Adr Cor Metrazol	 5 cc 3 cc	B P dropped, then held steady throughout procedure
High—18 Low —15	1¼% throughout	Coramine Adr Cor Metrazol	1 5 cc 3 cc	B P rose rather steadily, pulse rose rapidly then steadied, throughout oper
High—22 Low —12	1¼% throughout	Metrazol	1 cc	B P fell then rose slightly, pulse rose then steadied
High—22 Low —16	1-1-2-¼%	Metrazol	1 cc	B P fell steadily, slowly
Steady at 18	1% throughout	Coramine Adr Cor Metrazol	1 5 cc 6 cc 1 5 cc	B P and pulse rose steadily throughout procedure
Steady at 18	1-3-4-½-¼%	Metrazol	3 cc	B P fell unevenly, then rose, pulse rose unevenly throughout procedure
High—27 Low —15	3-4-¼%	Coramine Metrazol	2 cc 1 cc	B P rose rapidly between extremes, then steadied at 140
High—22 Low —15	1-¼%	Coramine Adrenal Cortex Metrazol Picrotoxin	1 5 cc 5 cc 2 cc 1 5 cc	B P held steady for 1st 50 minutes, then rose 10 points for next hr then returned to original value
High—29 Low —18	1-¼%	Coramine	1 5 cc	B P rose between limits at end of 1st 20 minutes
High—22 Low —12	1% throughout	Coramine Lugol's Metrazol	1 5 cc 60 drops 1 cc	B P rose rapidly, steadied, rose again, then fell
High—22 Low —17	1% throughout	Metrazol	1 cc	B P fell, then rose slightly, pulse rose rapidly, then steadied

entailed in delaying or even cancelling an operation entirely is less than the risk in performing it when the patient's mental attitude is unduly depressed.

The present or past use of drugs, alcohol and even tobacco can have a definitely prejudicial effect, especially upon the length of convalescence. So also can malignancy, diabetes or recent hemorrhage. When known, these can be duly taken into account and their dangers greatly reduced by judicious handling before and during surgery.

Knowledge of hepatic function is extremely important as detoxification takes place through the liver. Though pentothal sodium, unlike many anesthetic materials, has little, if any, disturbing effect upon liver function, it is well to build up the glycogen reserves of a liver known to be impaired, by a high carbohydrate diet prior to operation. Similarly, patients suffering from obstructive jaundice, should receive vitamin K and whole blood.

In the same way precautions should be taken against the effects of impaired heart or kidney function, especially in the aged. For renal insufficiency be sure that urea, non-protein nitrogen and creatinine determinations have been done; in circulatory abnormality, especially decompensation accompanied by dysponea, with or without coronary disease, the use of adequate oxygen during anesthesia is especially imperative. If respiratory embarrassment is at all marked, helium should be given with the oxygen, as this seems to assist greatly in opening and inflating the air sacs of the lungs. It should also be noted that oxygen, 100 percent, given postoperatively, seems to reduce flatulence to a minimum.

Where pneumonia, effusion, pleurisy or tuberculosis exist, the risk, is of course, proportionately greater and surgery should be delayed if at all possible. Yet even in these dire situations, the effects of pentothal sodium anesthesia seem to be less deleterious than those of other anesthetics. An intercurrent cold or subacute bronchitis or some similar condition, though not conducive to the best surgical results, does not contraindicate surgery in an emergency, for again pentothal sodium intravenously, in the indicated percentages, has no demonstrable untoward effects.

CONCLUSIONS

1. Intravenous pentothal sodium, administered by the continuous drip method and reduced from an initial 1 percent, successively to ¾, ½ and ¼ of 1 percent, is an adequate anesthetic in major surgery, usually without any other anesthetic material as an adjuvant.

2. It is safe and simple to administer, providing sufficient relaxation, with little or no postoperative toxemia, dehydration or nausea.

3. Patients who know of this anesthetic frequently request it.

4. It may be used even for lengthy (two to three hours) procedures without ill effect.

5. The anesthetist has complete control over the administration of this material at all times and may govern it accurately according to the individual needs of the patient.

Fig. 1. The patient's arm suitably secured and the apparatus for intravenous administration of the anesthetic material, as well as plasma or other supportive solutions, in place.

SUMMARY

Having used intravenous pentothal sodium anesthesia in all of his major surgical procedures and many minor ones over a period of three years, the author concludes that this is the best and most satisfactory material with which he is familiar. The advantages and importance of adequate and suitable preopera-

tive preparation of the patient, has been outlined. Also the details of anesthetic technic with this material, plus a brief resumé of the medicaments, especially curare, which under certain conditions, may advantageously be used in conjunction with it, has been given. In conclusion a warning regarding special hazards, such as cardiac or renal insufficiency, for the surgical patient, with this, as well as any other anesthetic material, has been presented.

RIASSUNTO

Avendo operato per tre anni tutti i casi di grande, e molti casi di piccola chirurgia con quest'anestesia endovenosa, l'A. se ne dichiara un convinto fautore. L'A. discute i vantaggi su altri metodi di anestesia: illustra i diversi procedimenti e le svariate precauzioni preoperatorie: descrive la tecnica dell'anestesia semplice o combinata con l'uso di altri medicamenti, come il curare, utili in taluni casi. Certi pericoli, comuni ad altre anestesie, sono naturalmente inevitabili: specialmente quelli inerenti ad un'insufficienza cardiaca o renale.

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Debido a su experiencia de mas de tres anos con la anestesia intravenosa por el pentotal sodio en procedimientos de cirujia alta y menor, el autor concluye que este anestetico es el mejor y mas satisfactorio de los que el ha tenido experiencia. Se ha presentado un resumen de sus ventajas y de la importancia de la preparacion pre-operatoria para obtener los mejores resultados. Tambien se presenta la tecnica usada en la administracion de este anestetico y de otros medicamentos, especialmente el curare, y cuyo uso es ventajoso en ciertas condiciones.

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SOMMAIRE

Durant les trois dernières années l'auteur fait un usage exclusif de l'anesthésie intraveineuse à l'aide du pentothal-sodium pour les grandes ou petites opérations, Rater est d'avis que cet agent donne les résultats les plus satisfaisants que l'on connaisse. Les avantages et l'importance d'une préparation préopératoire adéquate et soignée du malade sont décrits. L'auteur nous donne les détails de sa technique d'anesthésie et nous résume en détail les médicaments qui, dans certaines conditions peuvent être employés avantageusement avec le pentothal-sodium. Il nous énumère les hasards de l'emploi de pentothal-sodium ou de tout agent anesthésique dans les cas d'insuffisance cardiaque, rénale ou hépathique.

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The present or past use of drugs, alcohol and even tobacco can have a definitely prejudicial effect, especially upon the length of convalescence. So also can malignancy, diabetes or recent hemorrhage. When known, these can be duly taken into account and their dangers greatly reduced by judicious handling before and during surgery.

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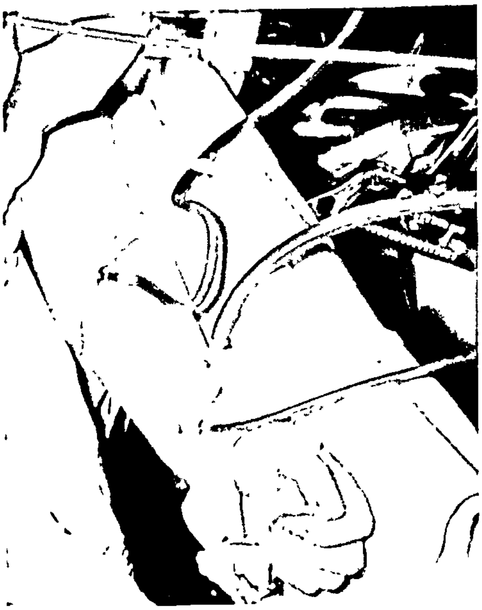

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Urinary Bladder Obstructions in Children

JAMES F. McCAHEY, M.D., F.I.C.S.
PHILADELPHIA, PA.

SINCE the opening of the Nazareth hospital in 1940, 11 children have been operated upon for urinary bladder obstruction. These children varied in age from eight months to 14 years, and were all white and male, except for one female. The etiological factors were: urethral stricture, two cases; large ureterocele, one case—the girl; and vesical neck obstruction, eight cases.

The pertinent facts relative to the management of these conditions furnish the data for this report.

STRICTURE OF THE URETHRA

Case 1: D. D., male, 15 years old. He was admitted January 6, 1941, complaining of hematuria with frequent, painful, difficult urination. He said that at the age of three he had acute retention of urine due to a congenital urethral stricture. An operation performed at that time had resulted in a hypospadius extending along the entire pendulous penile urethra. The urine contained a trace of albumin and many leucocytes. Blood studies showed hemoglobin, 71 percent; erythrocytes, 4,020,000; leucocytes, 8,500; urea nitrogen, 15 mg. percent. Small stones in the bladder and posterior urethra were demonstrated by roentgenograms and intravenous urography revealed bilateral hydronephrosis with dilated tortuous ureters.

The stones were removed through a suprapubic cystotomy and later the stricture at the bulbomembranous junction was divided through an external urethrotomy. The urinary symptoms were relieved but the boy refused operation for correction of the penile deformity.

Case 2: R. D., male, 14 years old. The patient was admitted February 9, 1947 complaining of hematuria, severe dysuria and urinary frequency. The duration of the symptoms was given as two months. Blood studies showed hemoglobin, 90 percent; erythrocytes, 4,570,000; leucocytes, 7,500; urea nitrogen 15 mg. percent. The urine was alkaline and contained albumin and many red and white blood cells. Intravenous urography disclosed absent left renal function with marked hydronephrosis and hydroureter on the right (Fig. 1).

Cystoscopy could not be done because of a stricture of the urethra about 3 cm. beyond the meatus. Filiform guides could be passed through the stricture but would impinge in the region of the deep urethra and it was thought that vesical neck obstruction existed.

A suprapubic cystotomy was performed and it was found that the vesical area was occupied by a large diverticulum separated from the compressed bladder by an orifice at the base in the mid-trigonal area (Fig. 2).

A filiform guide was passed through the orifice into the compressed bladder and through the internal vesical outlet. Flexible followers were fitted to the end of the guide and pulled through the strictured urethra. A urethral catheter was then inserted and the wound closed around a suprapubic tube. The patient was able to void after removal of the tube but the operative sinus continued to drain. Despite urethral dilatation the greater portion of the urinary output came through the abdominal sinus. Therefore it was deemed best to do a right cutaneous ureterostomy.

BLADDER OBSTRUCTION DUE TO A LARGE URETEROCELE

Case 3: M. V., female, 9 years old. She was admitted August 3, 1947, and complained of difficulty in urination, constant pain in the right lower abdomen and occasional less severe pain in the left lower quadrant. Also she was subject to frequent attacks of fever. The symptoms had originated about three years before admission at which time a urological examination including cystoscopy and intravenous urography was reported negative.

The urine contained a trace of albumin and many leucocytes and culture revealed E. Coli. Blood studies showed hemoglobin, 79 percent; erythrocytes, 4,250,000; leucocytes, 6,400; urea nitrogen, 11 mg. percent.

Intravenous urography disclosed some delay in excretion bilaterally with a double left kidney showing some hydronephrosis in the lower half. On the right there was a normal shadow of pelvis and calyces of a single kidney (Fig. 3).

At cystoscopy a mass was found in the bladder. It seemed to be mostly on the left and covered the trigonal area. A diagnosis was made of the left ureterocele.

The operation revealed that the mass arose from the right near the ureteral orifice, extended to the left across the floor and up the lateral wall of the

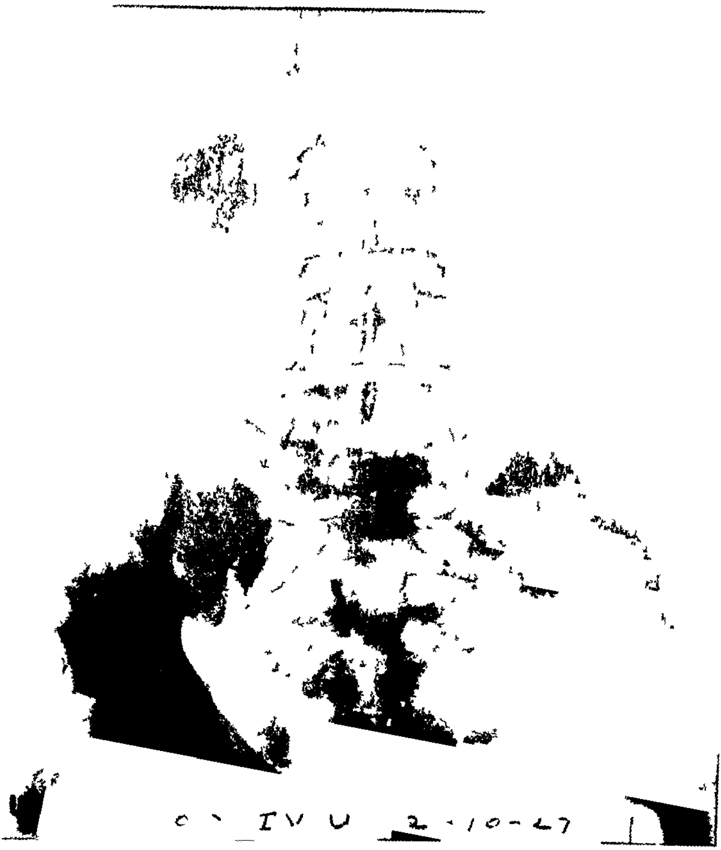


Fig. 1. *Case 2.* The 30 minute intravenous urogram showing absence of left renal function and right hydronephrosis and hydroureter

bladder. It was filled with purulent fluid and communicated with an opening near the right ureteral orifice. After dissecting away the walls of the cyst a ureteral catheter was passed up the opening and a retrograde pyelogram was made. This disclosed a hydronephrotic right kidney above the normal one shown on intravenous urography (Fig. 4).

Thus it became evident that we were dealing with an enormous ureterocele arising from the ureter of the upper portion of a right double kidney and that this upper kidney was infected and hydronephrotic. The bladder was closed around a suprapubic tube.

Later the right kidney was exposed and an anomalous vessel was found crossing behind the ureter of the upper portion thus producing hydro nephrosis. This vessel entered the hilus of the lower portion of the kidney and had to be preserved (Fig. 5).

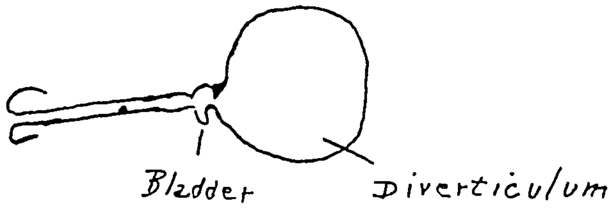


Fig. 2. *Case 2:* Diagram of relation of diverticulum to remains of true bladder.

The upper half of the kidney was removed and pathological examination showed advanced chronic atrophic pyonephritis and hydroureter with chronic ureteritis.

That the child has been free of symptoms and normal function of the remaining part of the right kidney is indicated by intravenous urography.

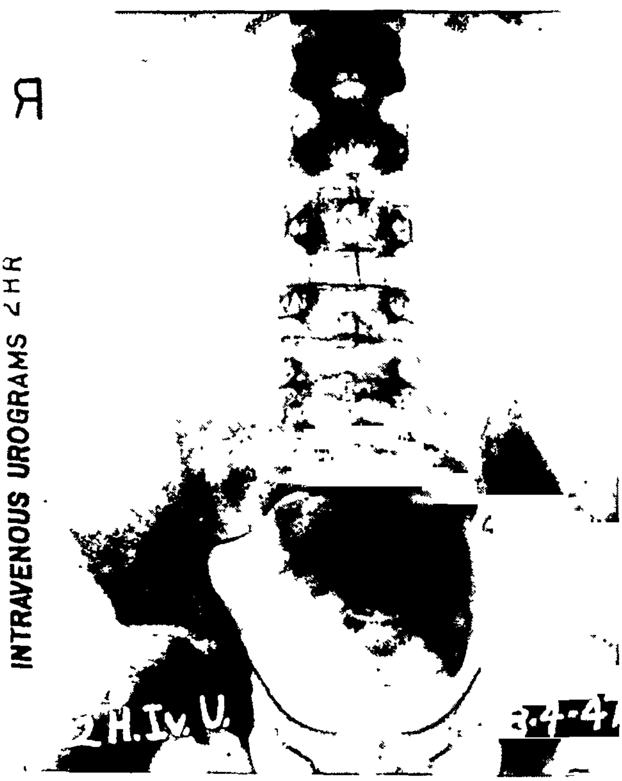
VESICAL NECK OBSTRUCTIONS

A brief description of the principal findings in eight cases (Nos. 4 to 11) of vesical neck obstruction follows. In all but two cases there were concomitant changes in other parts of the urinary tract such as ureteral dilatation, hydronephrosis and renal non-function. Three also had vesical diverticuli.

The usual methods of dealing with the obstructive tissue were employed in these cases—cystoscopic fulguration in *case 6;* manual dilatation of the internal orifice suprapubically in *case 10;* and dissection of the obstructing tissue suprapubically in the remainder.

Two stage operations were used when diverticuli were present. The first stage consisted of suprapubic cystotomy and dissection of the obstructing tissue; the second of the diverticulectomy. In two children a transverse incision was used for the first stage and the suprapubic tube brought out in the middle of the incision. The usual vertical incision was then resorted to for the diverticulectomy.

Case 4: D. A., 8 months old, was admitted April 4, 1947. Aside from frequent colds the child had been healthy until the previous day when it cried continuously and the mother noticed that its abdomen was hard. Physical examination was nega-



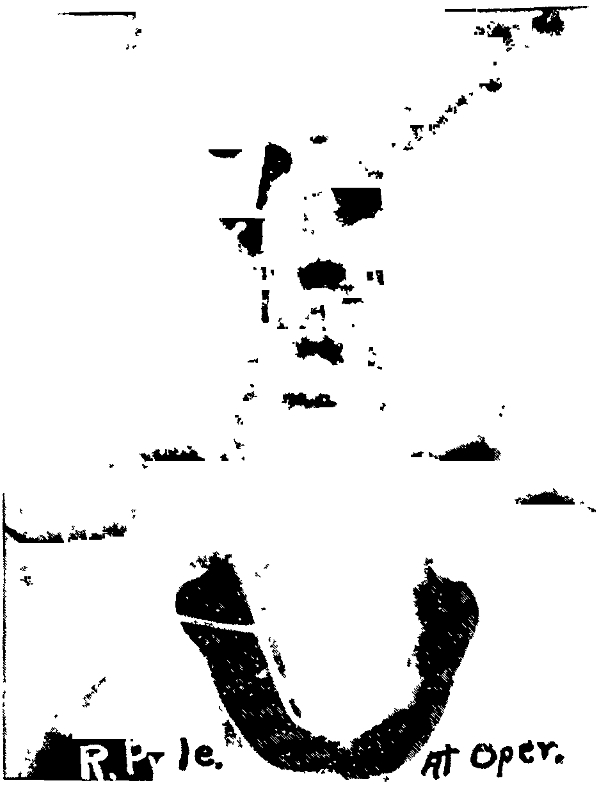


Fig. 3. Left. *Case 3:* A 2 hour intravenous urogram showing distended bladder and a single right kidney.
Fig. 4. Right. *Case 3:* A retrograde pyelogram made at operation for removal of ureterocele. This shows hydronephrotic upper portion of right kidney which was not visualized on the intravenous urograms because it did not excrete the contrast medium.

tive except for generalized abdominal rigidity Rectally a large pelvic mass was palpable which was diagnosed a large vesical diverticulum A catheter was passed and 350 cc of urine was obtained Intravenous urography showed marked left hydronephrosis and hydroureter and similar less extensive changes on the right (Fig 6)

Obstructive tissue around the vesical neck was found at cystoscopy This tissue was removed through a suprapubic cystotomy The diverticulum was on the left and contained the ureteral orifice There was an upper digitation which was readily removed and a lower pouch extending deep into the pelvis which was removed with difficulty and necessitated tying off the left ureter

Six weeks following discharge the child was readmitted because of fever The urine contained many pus cells and the culture showed staphylococci Cystoscopy revealed low grade cystitis with good closure of the former diverticular orifice Before admission sulfonamide and penicillin therapy had been tried without success It was then decided to try local treatment and 3 cc of silver nucleinate were instilled into the bladder daily through a catheter This rapidly cleared the urine Intravenous urography showed the right kidney and bladder to be normal (Fig 7)

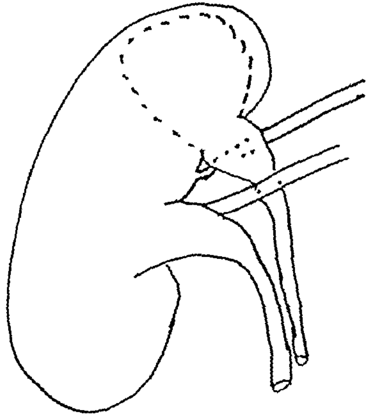
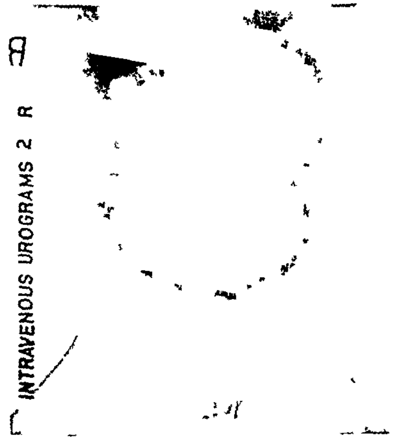


Fig 5 *Case 3* Diagram of vascular supply of right double kidney An anomalous vessel supplying the good lower half crosses the ureter of the hydronephrotic upper half



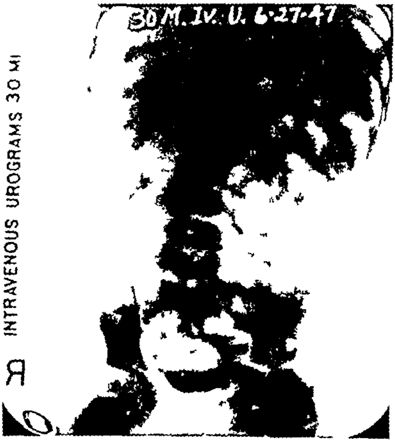


Fig 6 Left *Case 4* A 2 hour intravenous urogram showing bladder distended so much as to obscure the right kidney area The left kidney is hydronephrotic
Fig 7 Right *Case 4* The 30 minute intravenous urogram after operation showing normal bladder and right kidney

Case 5: W. H., 20 months old, was admitted November 14, 1945. Three weeks previously the mother had noticed a bloody tinge in the urine and a week later his abdomen became hard. He urinated often and cried each time. Studies were negative except for obstructing tissue at the vesical neck found at cystoscopy, which was removed through a suprapubic cystotomy with relief of symptoms. This is one of the two cases with no pathological changes elsewhere in the urinary tract which could be attributed to the bladder neck obstruction.

Case 6: J. La P., 2 years old, was admitted June 11, 1945. He had intermittent attacks of hematuria for a year. Roentgenography showed a stone in the right kidney pelvis with absence of renal function. Cystoscopy disclosed obstructing tissue at the vesical neck which was destroyed by cystoscopic fulguration. At operation for removal of the stone from the right kidney pelvis an anomalous vessel crossing the ureter posteriorly was found and ligated. Subsequent studies did not show a return of kidney function. It is evident that in this case the renal pathology may not have been attributable to the vesical neck obstruction.

Case 7: W. M., 3 years old, was admitted December 3, 1945 because of vomiting. Physical examination was negative except for a distended bladder. The urine was normal. Blood studies showed: hemoglobin, 71 percent; erythrocytes, 4,240,000; leucocytes, 8,200; urea nitrogen, 17 mg. percent. Intravenous urography disclosed right ureteral dilatation. A median bar type of obstruction was found on cystoscopy and this was dissected through a suprapubic cystotomy.

Case 8: G. F., male, 3 years old. He was admitted May 19, 1943. The mother said that the child had never learned to control his bladder. Since birth he wets his pants about every 15 minutes during the day and also has enuresis. On physical examination the bladder was found distended almost to the umbilicus. The urine was negative. Blood findings were: hemoglobin, 82 percent; erythrocytes, 4,300,000; leucocytes, 8,200; urea nitrogen 17 mg. percent. Intravenous urography showed absence of left renal function. There was delay in excretion on the right but no evidence of hydronephrosis. At cystoscopy obstructing tissue at the vesical neck was seen.

The bladder was found to be almost an inch thick when opened at operation and the internal orifice could not be located. A *No. 10* soft rubber catheter was passed through the urethra but became obstructed in the posterior urethra. A finger was passed into the rectum to aid in manipulating the catheter into the bladder through the almost occluded internal orifice. The obstructing tissue was dissected away.

The child was completely relieved of symptoms for four years but then began to wet his pants again although there was no recurrence of the enuresis. At cystoscopy tissue resembling redundant mucous membrane was seen around the vesical neck. This was fulgurated cystoscopically with the result that a slough formed which had to be removed suprapubically. Normal urination became reestablished.

The urinary disturbance in this case resembles overflow incontinence but it is clear that hypertonicity of the bladder musculature induced by the vesical neck obstruction was the basis for the symptoms.

Case 9: S. M., male, 4 years old, was admitted September 3, 1946. He had awakened in the early morning crying with pain and had difficulty in urinating but was relieved afterward. On admission the bladder was greatly distended and the child urinated about one quart. He had a fever of 102 F. The urine was negative. Blood findings were hemoglobin, 72 percent; erythrocytes, 4,290,000; leucocytes, 3,850; urea nitrogen, 36.4 mg. percent. Rectal examination disclosed a large diverticulum. Neither kidney was visualized on intravenous urography. Cystoscopy showed vesical neck obstruction.

Following suprapubic cystotomy and dissection of the obstructing tissue at the vesical neck the fever abated and the blood urea nitrogen declined to 19.9 mg. percent. Intravenous urography showed left hydronephrosis but no function on the right. At a later date the diverticulum was removed.

Case 10: G. G., 6 years old, was admitted March 18, 1942 complaining of diurnal urinary frequency every 20 minutes but without enuresis. The urine was negative. Blood studies were: hemoglobin, 74 percent; erythrocytes, 3,730,000; leucocytes, 7,550; urea nitrogen, 11 mg. percent. Obstructing tissue at the vesical neck was seen at cystoscopy. An abdominal roentgenogram showed absence of the lower sacral and coccygeal segments of the spinal column. Intravenous urography disclosed a large bladder and left hydronephrosis and hydroureter. A suprapubic cystotomy was done and the internal orifice dilated manually. This maneuver seemed sufficient to overcome the obstruction. The child subsequently was able to retain urine for two or three hours. This is the only case of the series showing a deformity not related to the urinary tract pathology.

Case 11: M. McK., 8 years old, was admitted

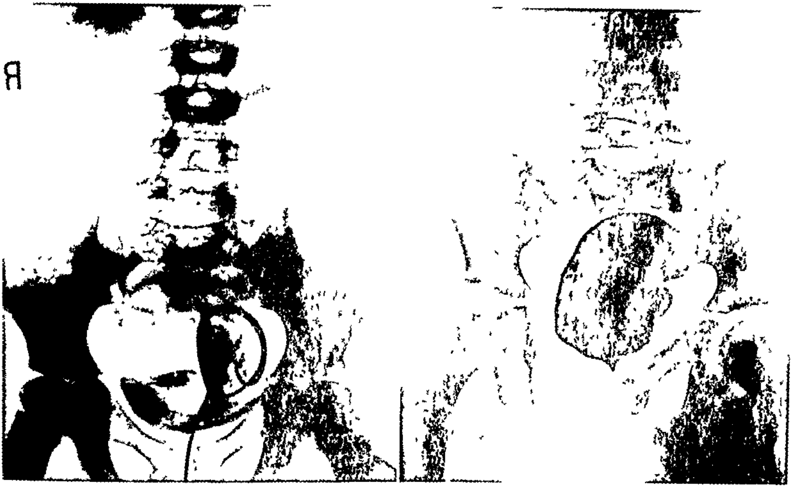


Fig. 8. Left. *Case 11.* Film showing catheter coiled up in large vesical diverticulum.
Fig. 9. Right. *Case 11.* Cystogram after diverticulectomy. A suprapubic tube is present in the bladder.

February 12, 1945 complaining of painful difficult urination for six months with some frequency and occasional nocturia. The urine contained albumin but no white blood cells. Blood examinations showed: hemoglobin, 75 percent, erythrocytes, 4,300,000, leucocytes, 8,400, urea nitrogen, 23 mg. percent. Intravenous urography disclosed normal kidney function but only a trace of excretion on the left. Obstructing tissue at the vesical neck and a diverticular orifice were seen on cystoscopy (Fig. 8).

Through a transverse incision the bladder was opened, the obstructing tissue dissected away and the bladder closed around a tube. The left kidney was explored at a later date and found to be atrophic and removed. Pathological examination showed chronic atrophic pyelonephritis. Later the bladder was opened through a vertical incision and the diverticulum removed (Fig. 9). Urination became normal.

SUMMARY

A study is presented of 11 cases of urinary bladder obstruction in children. In all but one instance the patients were boys. The vesical obstruction in the girl was an enormous ureterocele arising from one of the ureters of a double kidney. Two of the boys had urethral stricture and the other eight had vesical neck obstruction. All but two of these 10 had resultant changes in the bladder, ureters or kidneys.

Two stage operations were used in dealing with vesical neck obstruction associated with diverticuli. It was found advantageous to expose the bladder through a transverse incision for the first stage and through the usual vertical incision for the second operation.

RIASSUNTO

Descrive 11 casi di ostruzione vescicale in bambini. 10 erano maschi. Nell'unica bambina l'ostruzione vescicale era un enorme ureterocele insorto da uno degli ureteri di un rene doppio. In due maschi esisteva un restringimento uretrale, mentre negli altri otto si era stabilita un'ostruzione del collo della vescica. In tutti i casi, meno in due, la vescica, gli ureteri o i reni rivelavano conseguenti modificazioni anatomo-patologiche.

Nelle ostruzioni del collo della vescica associata a diverticoli l'A. ha fatto ricorso ad un'operazione in due tappe. E cioe': ha dapprima esposto la vescica mediante un'incisione trasversale, mentre ha fatto appello ad un'incisione verticale nella seconda operazione.

SUMARIO

Se presenta un estudio de 11 casos de obstruccion de la vejiga urinaria en criaturas. 10 de los casos fueron ninos. La obstruccion vesical en la unica nina de esta serie se debio al ureterocelo resultante de uno de los ureteres de un rinon doble. Dos de los muchachos presentaron una estrictura uretral en cambio los ocho restantes presentaron obstruccion del cuello de la vejiga. Todos los muchachos con excepcion de dos presentaron cambios patologicos, resultante de la obstruccion, en la vejiga, ureteres y rinones.

En los casos de obstruccion del cuello con diverticulo de la vejiga la cirujia se practico en dos etapas: en la primera se hizo una exposicion de la vejiga por medio de una incision transversal, mientras que en la segunda operacion se uso la insicion vertical, que es la usual.

SOMMAIRE

Il est considéré onze cas d'obstruction de la vessie urinaire chez les enfants; tous les cas sauf un étaient des garçons. L'obstruction vésicale chez la fille était un urétérocèle énorme d'un des urétères d'un rein double. Deux garçons avaient une obstruction du col de la vessie. Chez tous les malades exceptés deux, on trouva un changement dans la vessie, dans les urétères et dans les reins. Deux des malades présentaient un rétrécissement de l'urèthre; les autres huit cas avaient une obstruction du col vésicale. On employa l'opération en deux temps dans les cas d'obstruction du col de la vessie accompagnée de diverticule. Nous avons trouvé avantageux (dans le premier temps), d'exposer la vessie par une incision transversale et dans le second temps par une incision usuelle verticale.

A New Operation for Prolapsed Uterus and Modification of Montgomery's and Simpson's Operation for Retroversion

LOUIS L LAPI M D
ROCHESTER, N Y

FOR YEARS I have felt that the operations for prolapsed uterus associated with cystocele and rectocele following the menopause, have not been satisfactory Many specialists in the field also feel that up to the present time we have not had *one* satisfactory operation, primarily in the complete prolapsed cases in women of 60 or over whose pelvic tissues have undergone, or which are undergoing senile atrophy

A brief review of the operations so far formulated will illustrate the evaluation of my procedure In highlighting their faults it will be shown where they have failed to give a permanent cure Many of the older operations relieved the condition for a short time although a recurrence of the original prolapse if not complete at least in part occurred in a good many cases Along with the above criticism, many of the older operations also gave way to abdominal complications which will be indicated

The operations performed are under the two headings

1 **Vaginal Route**
  A Watkin's interposition with perineal repair
  B Radical vaginal hysterectomy with restoration of the anterior and posterior vaginal wall

2 **Abdominal Route**
  A Extraperitoneal shortening of round ligaments
  B Intraperitoneal shortening of round ligaments
    1 Olshausen's
    2 Gilliam's
    3 Baldy Webster's
    4 Noble's method of shortening uterosacral ligaments
    5 Ventral fixation of the fundus of the uterus to the anterior abdominal wall
    6 Supravaginal hysterectomy
    7 Simpson's operation
    8 Montgomery's operation

The criticism to follow is not true in all cases for each surgeon selects the operation which will best suit his patient Perhaps some of the operations mentioned will be best suited for younger women or where the prolapse is mild But the operation which I have formulated is more satisfactory in extensive prolapses and for older women There is also less surgical risk involved and the added advantage of a permanent cure or relief

The disadvantages of the above are presented in the order given and no attempt is made to describe any of the operative procedures because of limited time and space Since I do not believe in the repair of a moderate prolapse until the childbearing period is past the advantages or disadvantages for that period are not to be considered If the condition is moderate, it can wait for the menopause As most of these conditions require a cystocele and rectocele repair at the same time there is no object in doing this operation during the childbearing period, except for extreme cases which can not be given palliative treatment

The disadvantages of Interposition operation (Vaginal route) are

1 Uterus may be too heavy or enlarged
2 No adnexal trouble can be treated
3 There is difficulty in shortening uterosacral ligaments
4 Later atrophy of uterus leaves anterior vaginal wall vulnerable

The disadvantages of a radical vaginal hysterectomy (Vaginal route) are

1 It leaves a weak pelvic floor in spite of cystocele and rectocele repair The natural vaginal plug is removed

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The disadvantages of a radical vaginal hysterectomy (Vaginal route) are

1 It leaves a weak pelvic floor *in spite of* cystocele and rectocele *repair The* natural vaginal plug is *removed*

2. Other abdominal pathology cannot be taken care of and many women who come up for this surgery have had some intra-abdominal operations which may render the procedure difficult at times.
3. The risk is greater than in the suspension operation to be described.

The disadvantages of extraperitoneal shortening of round ligaments (abdominal route) are:

1. It does not fully correct prolapse. It is adaptable to third degree retroversion with little or no prolapse.
2. Other intrapelvic pathology cannot be treated.

The present methods employed for the intraperitoneal shortening of the round ligaments will be discussed in the same order given in the introduction. The disadvantages of Olshausen's operation are:

1. It leaves three apertures in the abdomen into which knuckle of intestine or section of omentum may slip and become strangulated (Fig. 1).

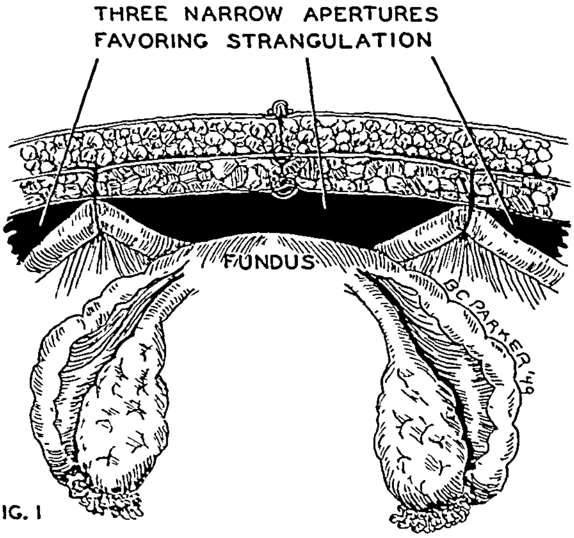

FIG. 1

2. After a period of time, due to the pull of the uterus, adhesion points stretch and recurrence of prolapse occurs. This has been seen even in simple suspension for retroversion. The contact adhesion is small and has no strength (Fig. 2).

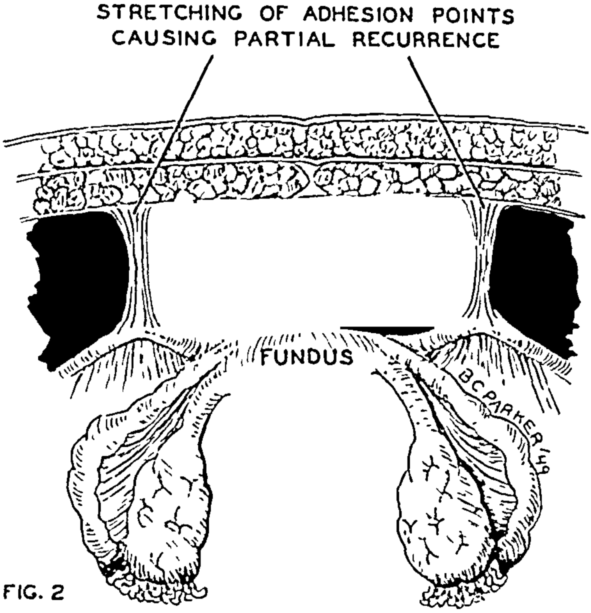

FIG. 2

In my opinion the use for Olshausen's operation is outdated and there is no excuse for its use even in simple retroversion. Gilliam's operation is to be condemned for almost the same reasons as the Olshausen, although it offers a stronger attachment to the anterior abdominal wall. Its disadvantages are:

1. It divides the lower pelvis into three apertures, with greater risk even than the Olshausen method because the apertures are more slit-like, and favor strangulation (Fig. 3).
2. Again, the points of stress are at a small surface (although larger than in Olshausen's operation) and they do not

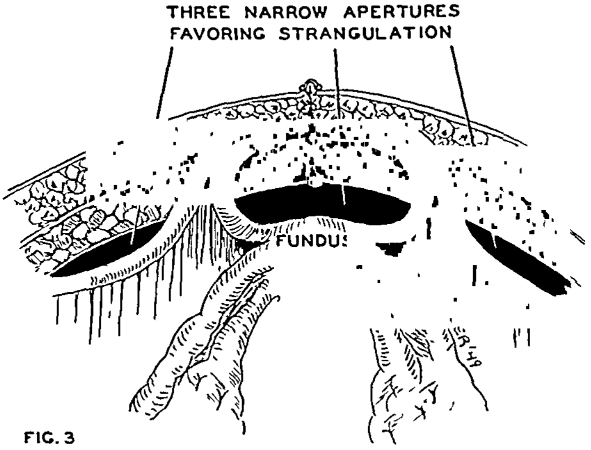

FIG. 3

take abdominal pressure as well as a large contact surface (Fig. 3).

The Baldy-Webster operation is only satisfactory in utero-displacement (retroversion) and in slight degrees of prolapse. Noble's method of shortening the uterosacral ligaments should never be done alone, but in conjunction with all other procedures in correcting prolapse. It is a valuable adjunct to other operations.

The disadvantages of ventral fixation are

1. When attached to the peritoneum the peritoneum glides down into the lower abdomen with pressure on the uterus and on the pelvic floor, and the uterus fails to remain in a satisfactory suspension
2. The same adhesion band may stretch and cause a recurrence over a period of time (Fig. 4).
3. There is no live tissue beside the scar tissue to hold the suspension, as will be compared with the newly formulated operation.
4. In ventral fixation, where the fundus and body of the uterus is put between the rectus muscle and sutured to the fascia, there is left a weakness in the incision, which is subject to ventral herniation

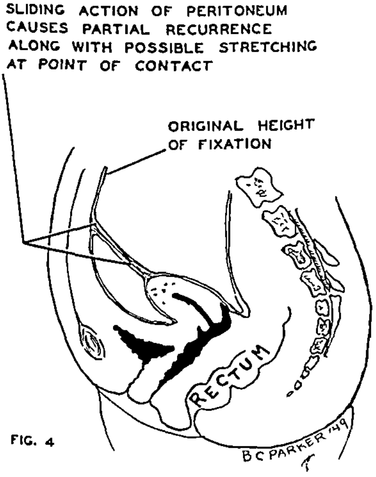
SLIDING ACTION OF PERITONEUM CAUSES PARTIAL RECURRENCE ALONG WITH POSSIBLE STRETCHING AT POINT OF CONTACT
ORIGINAL HEIGHT OF FIXATION
RECTUM
B C PARKER '49

FIG. 4

Supravaginal hysterectomy, while satisfactory along with perineal and cystocele repair, has its disadvantages. It is radical and carries with it a greater risk especially in older people, because the time element is longer, calling for more anesthesia, and the operation is more extensive

Because Simpson's and Montgomery's operations are so similar I shall just discuss the latter's While this operation is preferred in younger women with moderate prolapse associated with third degree retroversion and in the childbearing period, it is unsatisfactory for severe cases of prolapse encountered in women past the menopause

My modification of Montgomery's (Simpson's) operation dispenses with its disadvantages. Montgomery's operation leaves only one aperture which increases in depth and narrows with time This is because the round ligaments are made to travel about one inch from the incision between the peritoneum and the rectus muscle, and then is made to perforate the rectus muscle and anterior rectus

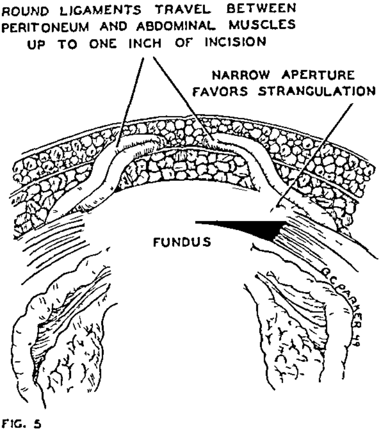
ROUND LIGAMENTS TRAVEL BETWEEN PERITONEUM AND ABDOMINAL MUSCLES UP TO ONE INCH OF INCISION
NARROW APERTURE FAVORS STRANGULATION
FUNDUS
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FIG. 5

sheath. As pressure and pull on the uterus is brought about, the stress tends to pull the peritoneum away from the anterior abdominal wall before its points of attachment at the anterior rectus sheath (Fig. 5, 6).

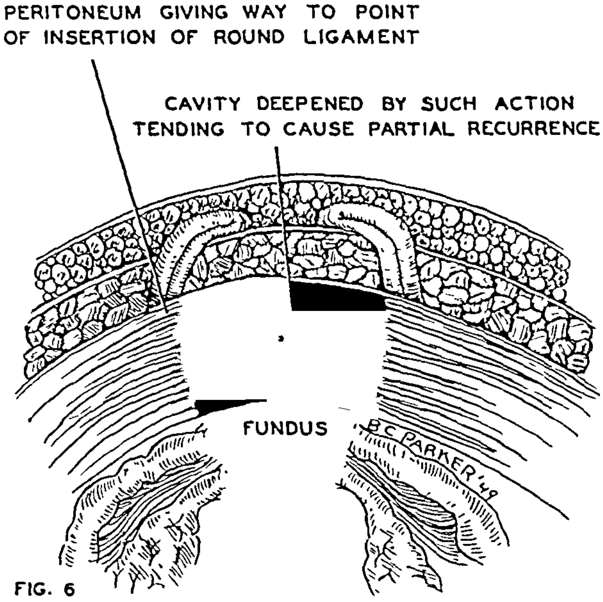

PERITONEUM GIVING WAY TO POINT OF INSERTION OF ROUND LIGAMENT
CAVITY DEEPENED BY SUCH ACTION TENDING TO CAUSE PARTIAL RECURRENCE
FUNDUS
BC PARKER '49

FIG. 6

A moderate recurrence of prolapse is possible. In order to get a good suspension the ligaments have to be drawn tightly, and a narrow slit aperture may be left, leading to strangulation of a knuckle of bowel (Fig 5). This operation has been modified so that the ligament, when it is drawn to the internal inguinal ring, is made to perforate through anteriorly to the external oblique fascia, and the knuckle of the round ligaments is attached to it (Fig. 7). Therefore, neither the parietal peritoneum nor the broad ligaments can be made to fan out and separate the suprapelvic cavity from the pelvic cavity. As the intra-abdominal pressure tends to push the uterus down, the points that take up the stress are lateral to the external edges of the rectus muscle and no small, narrow aperture can occur as in Figure 6. Also no give is likely to occur which will allow the uterus to prolapse. The operation, while satisfactory for moderate prolapse, is not sufficient to elevate the uterus in severe prolapse, as pulling the round ligaments taut from their attachments to the uterus and the internal ring does not sufficiently bring up the uterus to a full correction of the prolapse. It must be remembered in these cases that the cause of prolapse is atrophy or tear of other suspensory tissues. But we must rely on the uterus and round ligaments, along with cystocele and rectocele repair to effect a cure. It is obvious why this modification has all the advantages of Simpson's and Montgomery's operation without its disadvantages. I have used it exclusively on all retroversion operations in childbearing periods with no ill effects.

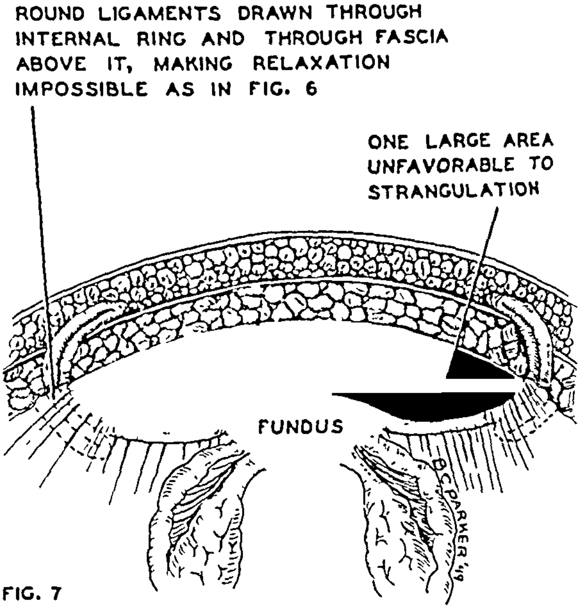

ROUND LIGAMENTS DRAWN THROUGH INTERNAL RING AND THROUGH FASCIA ABOVE IT, MAKING RELAXATION IMPOSSIBLE AS IN FIG. 6
ONE LARGE AREA UNFAVORABLE TO STRANGULATION
FUNDUS
BC PARKER '49

FIG. 7

NEW OPERATION FOR PROLAPSED UTERUS

Before deducting the advantages I shall go on with the technical procedure after the cystocele and rectocele are corrected in an approved manner. (I personally prefer in cystocele the raphe suturing of the bladder, after anchoring the bladder high over the internal os, and suturing the cervical vesicle ligaments together. Recently I have taken a fancy to Austin's technique, modifying that by adding the rapheing of the bladder.)

The cervix is cauterized or conized routinely before the cystocele and rectocele is repaired. Then the patient is put in extreme Trendelenberg position. A lower midline incision is made, dissecting on each side of the incision the subcutaneous fat for a distance of three to four centimeters. The fascia and the peritoneum is opened and the abdominal viscera are inspected for any other surgical pathology which may be found, and are treated accordingly The uterus is then grasped at the fundus with a tenaculum and the round ligaments are identified. They are put on a stretch by pulling the uterus up on the abdomen. The round ligament is cut at the internal inguinal ring and is dissected away from the broad ligament to its attachment at the uterus One must not dissect too closely to the uterus for fear of destroying the blood supply to the ligament. The surface of the broad ligament from which the round ligament has been dissected, is then carefully peritonized by invagination of its raw surfaces, or rolled around and sutured to the Fallopian tube (Fig. 8). The same process is repeated on the other side.

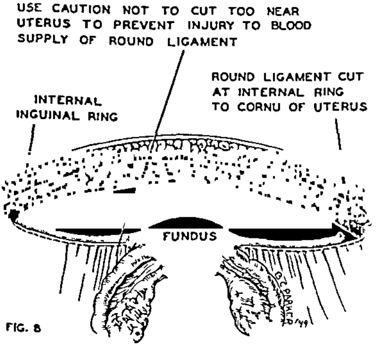

USE CAUTION NOT TO CUT TOO NEAR UTERUS TO PREVENT INJURY TO BLOOD SUPPLY OF ROUND LIGAMENT
INTERNAL INGUINAL RING
ROUND LIGAMENT CUT AT INTERNAL RING TO CORNU OF UTERUS
FUNDUS

FIG. 8

When the height of the point of attachment of the fundus of the uterus to the anterior abdominal wall is determined, a heavy silk suture is brought through the fundus of the uterus from cornu to cornu. The silk is then made to penetrate the peritoneum, rectus muscle, and the anterior rectus sheath, to the subcutaneous area which was denuded previously. An assistant then holds the silk taut to keep the uterus at the desired level. The round ligaments are made to penetrate the anterior abdominal wall in the same manner as the silk just lateral to the silk. Then the peritoneum is closed. When closing the peritoneum, the fundus of the uterus is sutured to the peritoneum from round ligament to round ligament, so as to obliterate any space for a knuckle of bowel or omentum to become strangulated (Fig. 9) In the individual case it may be desirable to roughen the fundus, at its point of suture to the peritoneum, to encourage firmer adhesions.

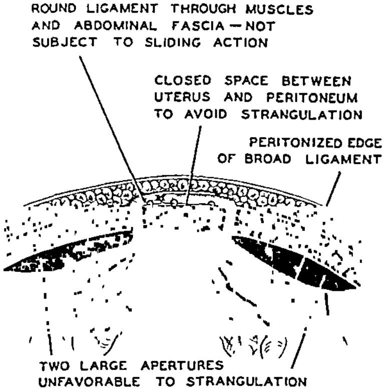

ROUND LIGAMENT THROUGH MUSCLES AND ABDOMINAL FASCIA — NOT SUBJECT TO SLIDING ACTION
CLOSED SPACE BETWEEN UTERUS AND PERITONEUM TO AVOID STRANGULATION
PERITONIZED EDGE OF BROAD LIGAMENT
TWO LARGE APERTURES UNFAVORABLE TO STRANGULATION

FIG. 9

The fascia is closed either with chromic number two or fine silk. The round ligaments are drawn moderately taut so that the circulation isn't impaired, and then they are sutured with silk to the fascia of the rectus sheath. When suturing the round ligaments to the fascia, the silk should not be placed horizontal to the length of the ligaments, but with fine silk the stitching should be at the edges, and only a small amount of tissue grasped (not hindering the circulation of the ligaments) thereby causing atrophy (Fig. 10).

At this point the silk retention suture, which was put in the fundus of the uterus, can either be tied and left in for additional support until firm adhesions are formed at the fundus and peritoneum, and the round ligaments to the fascia, or it can be removed. I feel that sufficient support is given by the round ligaments sheath. As pressure and pull on the uterus is brought about, the stress tends to pull the peritoneum away from the anterior abdominal wall before its points of attachment at the anterior rectus sheath (Fig. 5, 6).

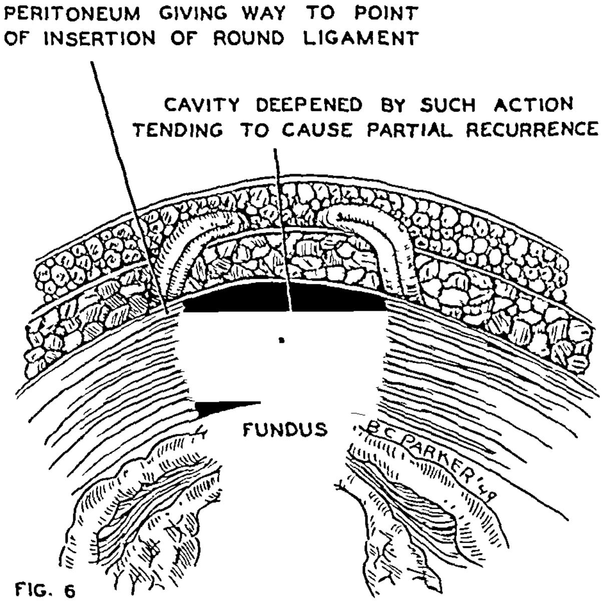
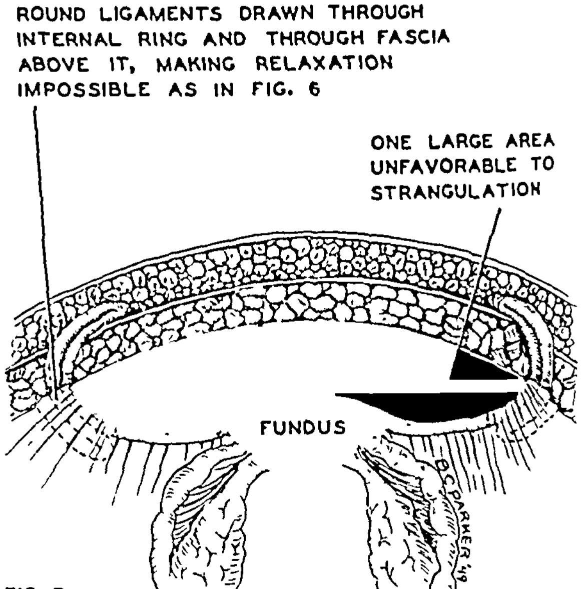

PERITONEUM GIVING WAY TO POINT OF INSERTION OF ROUND LIGAMENT
CAVITY DEEPENED BY SUCH ACTION TENDING TO CAUSE PARTIAL RECURRENCE
FUNDUS
B.C. PARKER '49

FIG. 6

A moderate recurrence of prolapse is possible. In order to get a good suspension the ligaments have to be drawn tightly, and a narrow slit aperture may be left, leading to strangulation of a knuckle of bowel (Fig 5). This operation has been modified so that the ligament, when it is drawn to the internal inguinal ring, is made to perforate through anteriorly to the external oblique fascia, and the knuckle of the round ligaments is attached to it (Fig. 7). Therefore, neither the parietal peritoneum nor the broad ligaments can be made to fan out and separate the suprapelvic cavity from the pelvic cavity. As the intra-abdominal pressure tends to push the uterus down, the points that take up the stress are lateral to the external edges of the rectus muscle and no small, narrow aperture can occur as in Figure 6. Also no give is likely to occur which will allow the uterus to prolapse. The operation, while satisfactory for moderate prolapse, is not sufficient to elevate the uterus in severe prolapse, as pulling the round ligaments taut from their attachments to the uterus and the internal ring does not sufficiently bring up the uterus to a full correction of the prolapse. It must be remembered in these cases that the cause of prolapse is atrophy or tear of other suspensory tissues. But we must rely on the uterus and round ligaments, along with cystocele and rectocele repair to effect a cure. It is obvious why this modification has all the advantages of Simpson's and Montgomery's operation without its disadvantages. I have used it exclusively on all retroversion operations in childbearing periods with no ill effects.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Case Report

Surgical Approach to Strangulated Hernia in the Aged

GORDON E. PERRIGARD, M.D., C.M.
MONTREAL, P. Q.

STRANGULATED small bowel hernias, especially the femoral type in elderly patients, may be complicated by perforation of the intestine brought on by the efforts of coughing or vomiting, or by necrosis and infection from reduction en masse and wound infection. The following two cases are illustrative:

Case 1: Female, white, 72 years of age. On admission she had abdominal distension, pronounced cardiac arrhythmia, jaundice and lobar pneumonia. The patient had experienced a pain in her right groin about three days prior to admission, and had been coughing and vomiting since then. Abdominal pain finally became so severe she sought surgical attention. In the right groin there was a non-reducible femoral hernia.

On operation the femoral hernia containing omentum was reduced and repaired. A faint odour of feces was noticed and accordingly the abdomen was explored. The intestines, covered with flecks of bowel contents, were floating on pools of pale brownish fecal smelling fluid. A necrotic section of the small bowel was found with a perforation about two and a half inches long, with omental adhesions fixed to the side of the bowel. Part of the omentum showed a torn necrotic area where it had been adherent to the region of the femoral hernia (Fig. 1).

Apparently what had occurred was that the loop of bowel down in the femoral hernia sac had been torn loose by the strain of coughing and vomiting thus causing the perforation. A bowel resection was carried out and the abdomen closed.

Case 2: This case first came to my attention at postmortem examination. She was 70 years of age, with a preoperative history of sudden onset of abdominal pain with nausea and vomiting and the reappearance of a small mass in the left groin. She was operated for inguinal hernia by the inguinal route.

She survived ten postoperative days with persisting vomiting and abdominal distress. Postmortem examination revealed wound disruption with a collection of sanguinous serum in a necrotic cavity about two inches long extending from the lateral edge of the wound down medially to the femoral canal, through which entered a strangulated, perforated, necrotic knuckle of small bowel.

In the aged, any hernia which has the signs or symptoms of strangulation, should be surgically repaired through the intra-abdominal route, so that the intestines may be examined thoroughly for any perforations, and for any possible reduction of a hernia en masse, or the presence of multiple hernias may not be missed.

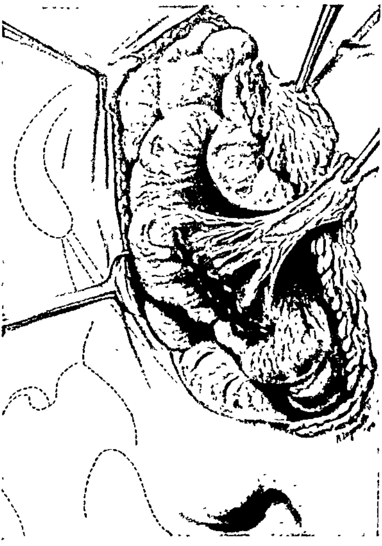

Fig. 1. Case of femoral hernia, sustaining perforation of small bowel, following spontaneous reduction from efforts of coughing and vomiting.

RIASSUNTO

Descrive due casi di ernia strozzata del tenue, con perforazione dell'intestino. In base all'osservazione di questi casi, l'A. ritiene che

—specialmente nei vecchi—ogni ernia sospetta di strozzamento debba essere operata per via intraaddominale onde ispezionare a fondo le condizioni dell'intestino.

SUMARIO

Se han presentado dos casos de hernia estrangulada del intestino delgado con perforacion intestinal.

Se sujiere, particularmente en los viejos, que toda hernia que presente evidencias de estrangulacion sea reparada intra-abdominalmente por cuanto solo asi se puede hacer una inspeccion completa de la viscera para determinar la presencia de complicaciones.

SOMMAIRE

L'auteur présente deux cas de hernie étranglée de l'intestin grèle, compliquée de perforation de l'intestin. Il suggère que chez le vieillard, toute hernie présentant des symptomes d'étranglement, soit reparée par la voie intra-abdominale. Cette voie permet l'examen au cours de l'opération des viscères abdominaux.

Sección en Español

Enclavijamiento Intramedular Del Esqueleto

ALFREDO GONZALEZ GARCIA, M D , F.I C.S
VEDADO, HABANA

SUMMARY

1. The intramedullary nail is in our opinion the ideal treatment in fractures of the shaft of long bones.
2. That it is possible thru proficiency in the technic to carry this procedure by the closed method, but if necessary an opened reduction may be performed without fear of serious complications.
3. In order to obtain good results by this procedure it is essential that the surgeon become very familiar with its technic.
4. That this procedure in our experience up to the present has been innocuous

EL enclavijamiento o fijación intramedular del esqueleto en las fracturas diafisiarias de los huesos largos es un procedimiento que nace en el año 1940 descrito por Küntscher de Kiel. El método consiste en introducir en el conducto medular una varilla metálica, y abre a nuestro juicio una nueva era en el tratamiento de estas fracturas.

No nos pasan desapercibidos los problemas de órden biológico que esta técnica representa. Entre estos podemos citar: la destrucción de la médula ósea, la embolia grasosa, el peligro de infección, la tolerancia de la varilla y la consolidación.

Destrucción de La Medula Ósea: No cabe duda que uno de los problemas que se plantea es la destrucción de la médula ósea que como sabemos sucede en ésta técnica, sin embargo, no hemos observado consecuencia alguna por las pequeñas porciones de médula que arrastra la varilla durante su paso por el canal medular, por lo tanto consideramos que no tiene importancia esta destrucción, y menos si recordamos que se han descrito técnicas anteriormente en que se extraía la médula ósea de los huesos largos para el tratamiento de la anemia perniciosa sin ninguna complicación.

Embolia Grasosa: La embolia grasosa que es complicación grave no la hemos observado. Gómez Navarro citado por el profesor Martín Lagos señala un aumento de la lipasa en la sangre en los días sucesivos a las fracturas.

La realidad es que no hemos visto la citada embolia en ningún trabajo. Los que hablan de esta complicación la señalan como muy rara, y además todos sabemos que es una complicación de cualquier técnica quirúrgica.

Peligro de Infeccion: La infección intramedular que nunca hemos observado es otro peligro señalado en los problemas biológicos de esta técnica, que podría hacer una mielitis, complicación de seria gravedad que todos conocemos.

No obstante, es de suponer que en los casos cerrados podría aparecer solamente por el arrastre de gérmenes del exterior, desde el punto de la perforación al foco de fractura y en los casos abiertos por el mecanismo de toda infección postoperatoria.

Tolerancia de La Varilla: La varilla intramedular es perfectamente tolerable y no hay que tener la preocupación que antigüamente se tenía con la síntesis interna pues lo mismo que a medida que las técñicas de las osteosíntesis han avanzado hasta que se han suprimido en la casi totalidad las intolerancias de las mismas, el enclavijamiento intramedular no ha producido intolerancia en ninguno de nuestros casos.

La reacción ósea del enclavijamiento se manifiesta por un callo perióstico abundante y si la varilla no es extraída a tiempo, este callo puede hacerse exhuberante lo cual hemos comprobado en dos de nuestros casos en que la extracción se hizo demasiado tarde.

Consolidación: La consolidación, con sorpresa nuestra, es rapidísima y más en algunos huesos que en otros, dependiendo del hueso y lugar de la diáfisis en donde se encuentra situada la fractura.

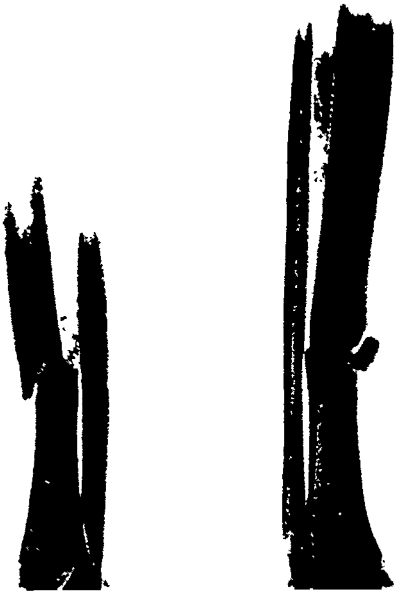

Fig. 1A

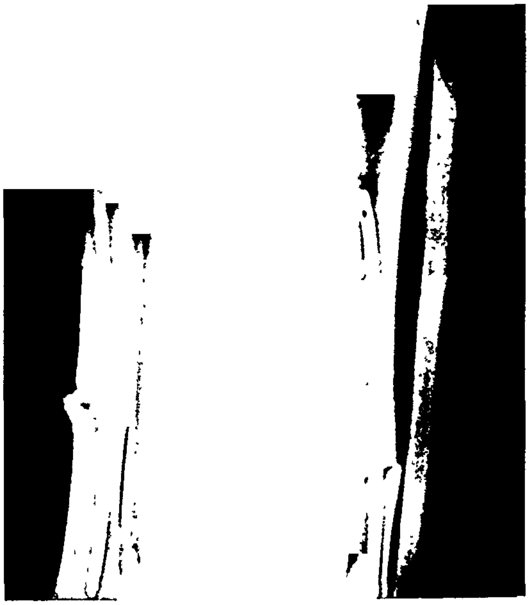

Fig. 1B

Debenos citar como ejemplo de esta aseveración que en el húmero hemos observado callo perióstico bastante sólido que comienza a las dos semanas y obtenido una consolidación total en seis semanas.

En un caso de fractura del tercio medio con el inferior de la tibia hemos encontrado un retardo de la consolidación y lo atribuímos a la nutrición más pobre del sitio de la fractura puesto que cuando las fracturas han sucedido en el tercio medio y en el medio con el superior la consolidación se ha desarrollado aceleradamente.

Es posible que la inmovilización del foco de fractura en condiciones más anatómicas como sucede en la mayoría de los casos en que se utiliza esta técnica, favorezca la rápida formación del callo ayudado por el estímulo poderoso de la movilización inmediata y de la deambulación precoz.

VENTAJAS DEL PROCEDIMIENTO

Las ventajas del enclavijamiento intramedular del esqueleto son:

Primero: Movimiento de las articulaciones vecinas, lo cual evita las rigideces articulares que tanto trabajo dan posteriormente en personas jóvenes y mucho más en personas de edad avanzada.

Segundo: Evita las atrofias musculares por la movilización inmediata después de la intervención quirúrgica.

Tercero: Este procedimiento permite que los pacientes puedan deambular a las pocas horas de ser intervenidos cuando se utiliza elmétodo cerrado, y cuando no, pueden deambular a los pocos días tan pronto han sido extraídos los puntos de la herida operatoria del foco de fractura.

Cuarto: El tratamiento se hace más económico porque los pacientes pueden abandonar a los pocos días el hospital o clínica donde están asilados y concurrir periódicamente a las consultas externas para su observación reglada hasta la extracción de la varilla.

Antes de señalar algunos de los casos de nuestra estadística, vamos a aconsejar algunos detalles de técnica fundamentales, y tomaremos como ejemplo, el fémur, la tibia y el húmero.

Femur: Para el enclavijamiento intramedular de la diáfisis femoral es necesario colocar al paciente lateralmente flexionando el miembro sano que se encuentra en contacto con la mesa y poniendo una o dos almohadas para que la pierna enferma descanse cómodamente a la vez que se coloca flexionada sobre el tronco.

Utilizamos la mesa ortopédica o la tracción manual según cada caso y después de comprobar radiológica o fluoroscópicamente que la reducción es perfecta lo cual a veces exige repetidas maniobras por el exceso de masas musculares que envuelven los fragmentos, practicamos una incisión por encima del vértice del trocanter mayor con el objeto de liberar al hueso. Hemos utilizado un perforador eléctrico para abrir el orificio por donde vamos a introducir la varilla metálica.

Esta introducción se realiza a golpe de martillo y después se sutura la piel. Somos partidarios de la incisión relativamente amplia, cuatro a cinco cms.

Fractura de La Tibia: Después de anestesiado el caso y reducida la fractura con el aparato de tracción de Bohler o simplemente haciendo tracción manual del miembro que en muchas ocasiones es suficiente, se comprueba la reducción por control fluoroscópico o radiográfico y obtenida la misma, se practica una incisión en la cara interna de la tibia a nivel de la tuberosidad anterior.

En lugar de usar el perforador de Künscher hemos hecho la perforación a cincel y martillo levantando un pequeño fragmento de la cortical de un cm cuadrado, por donde introducimos la varilla en el canal medular. Hemos ordenado la fabricación de las mismas por el molde del canal medular de varias tibias de cadáveres de distintos tamaños.

Elegimos de nuestras varillas, la de diámetro y longitud necesaria según cada caso, en algunos casos hemos puesto dos varillas convenientemente fabricadas y que adaptadas a la forma del canal de la tibia nos ha dado el resultado apetecido.

Introducimos la varilla a golpe de martillo hasta que sobresalga un centímetro por encima del orifico de entrada para su extracción posterior.

Uno o dos puntos de la piel completan la intervención y nunca hemos usado aparato de yeso inmovilizador.

Fractura del Humero: Generalmente utilizamos la anestesia de plexo braquial. Colocamos el enfermo en decúbito prono con el brazo en abducción y el antebrazo colgando de la mesa. Practicamos la incisión por encima de la foseta olecraneana para evitar la articulación del codo y por ser la vía de acceso menos peligrosa en la extremidad distal de la diáfisis humeral. Hemos desechado el abordaje por el fragmento proximal por creer que la técnica es más difícl y peligrosa.

Practicamos un orificio para introducir la

Fig. 2A

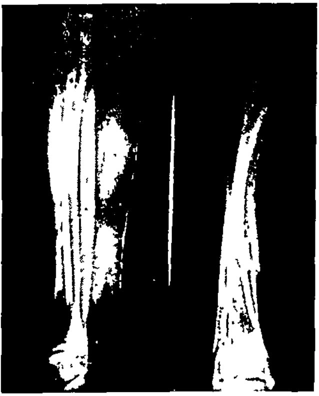

Fig. 2B

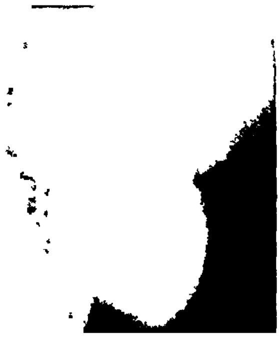

Fig. 3A

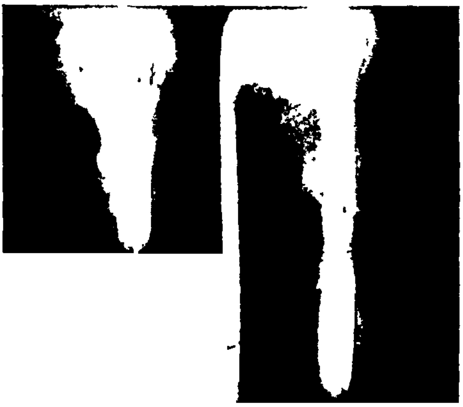

Fig. 3B

varilla en el canal medular, y continuamos nuestra técnica como en casos anteriores.

Debemos señalar que cuando la reducción no ha podido ser perfecta es necesario practicar una incisión en el foco de fractura para proceder al afrontamiento y poder pasar la varilla. No hemos tenido ninguna consecuencia en los caos en que hemos practicado la técnica a cielo abierto los cuales han evolucionado igual que los cerrados.

Caso 1: E. A., Natural de Güira de Melena, masculino, soltero, 28 años, raza blanca, campesino. Fractura del tercio medio con inf. de la tibia derecha con ligero desplazamiento y angulación. Reducción por enclavijamiento intramedular. Deambulación a los diez días. Retardo de la consolidación. Perfecto funcionamiento a los 60 días y curación total a los 150 días (Fig. 1A-1B).

Caso 2: D. M., Natural de Zulueta, masculino, soltero, 42 años, raza blanca, jornalero. Fractura

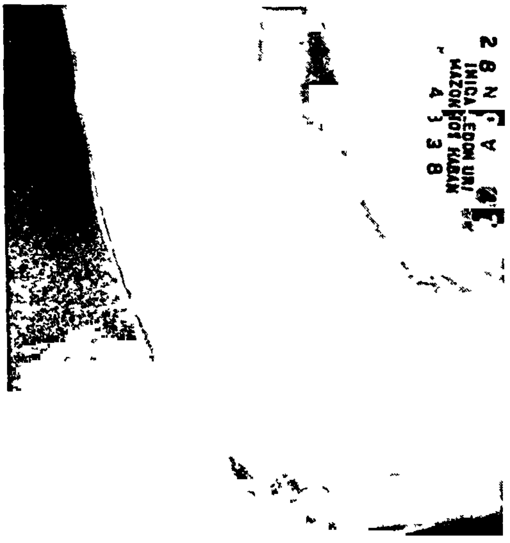

Fig. 4A

Fig. 4B

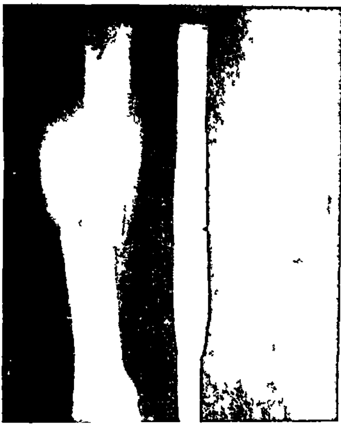

Fig 5A

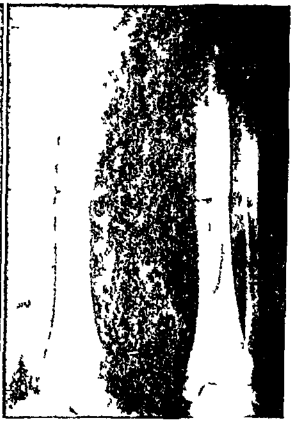

Fig 5B

por flexion de tercio medio de la tibia derecha y tercio inferior del perone del mismo lado con ligero desplazamiento lateral, reducida por enclavijamiento intramedular Deambulacion a los siete dias Resultado excelente con perfecto funcionamiento a los 90 dias (Fig 2A 2B)

Caso 3 A M, Natural de Aguada de Pasajeros masculino soltero, 29 años raza blanca, campesino Fractura del tercio medio con el superior del femur izquierdo con desplazamiento y angulacion Reduccion por enclavijamiento intramedular Deambulacion a los 10 dias Se traslada a su domicilio Perfecto funcionamiento a los 85 dias (Fig 3A 3B)

Caso 4 R M Natural de España masculino soltero 58 años raza blanca campesino Fractura del tercio inferior del humero izquierdo con gran desplazamiento Reduccion por enclavijamiento intramedular Comenzo la consolidacion a las dos semanas y tenia buen callo a los cuarenta dias A los ciento cincuenta dias recobra la movilidad del codo y se obtiene buen resultado (Fig 4A 4B)

Caso 5 H S Natural de Guira de Melena,

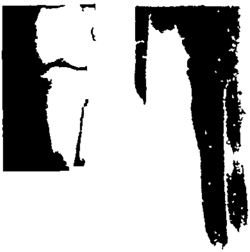

Fig 6A

Fig 6B

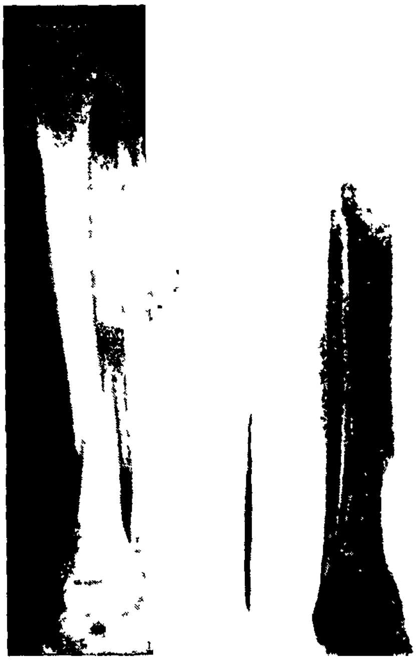
Fig. 7A

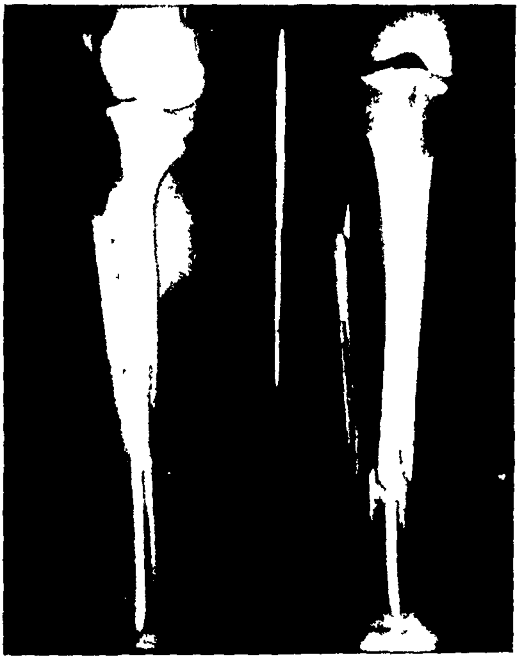
Fig. 7B

masculino, soltero, 19 años, raza negra, escolar. Fractura transversal del tercio medio de la tibia izquierda y de la unión de tercio medio con el inferior del peroné del mismo lado con desplazamiento y angulación. Fué reducida por enclavijamiento intramedular. Deambulación a los tres

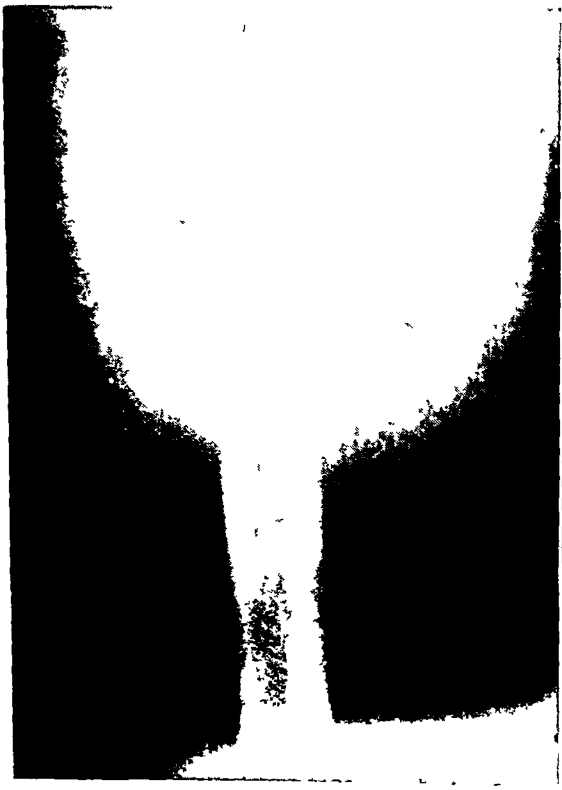
Fig 8A

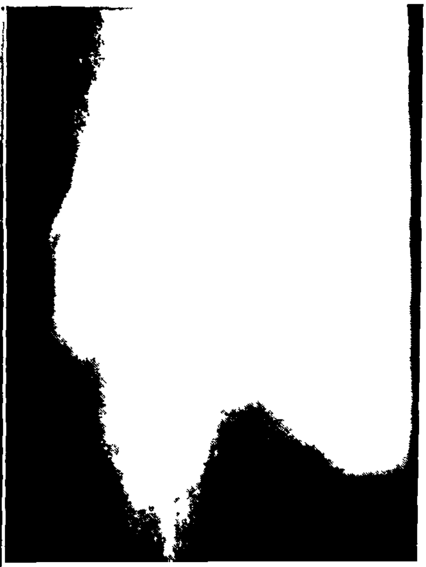
Fig. 8B

dias Consolidacion rapidisima Perfecto funcionamiento a los 60 dias (Fig 5A 5B)

Caso 6 R V, Natural de Ciego de Avila masculino, soltero, 38 años raza blanca, campesino Fractura del tercio inferior de la tibia derecha y tercio superior del peroné del mismo lado Reduccion con enclavijamiento intramedular Deambulacion a los 10 dias y excelente resultado a los 70 dias (Fig 6A 6B)

Caso 7 J B, Natural de Zulueta masculino, casado, 28 años, raza blanca carretero Fractura por torsion de tercio medio con tercio inferior de la tibia izquierda y tercio superior del peroné del mismo lado con ligero desplazamiento lateral Reduccion por enclavijamiento intramedular Deambulacion a los 20 dias Se traslado a su domicilio Continua deambulando perfectamente y en vias de curacion (Fig 7A 7B)

ESTADISTICA

(Desde Junio de 1946 a Mayo de 1948)

RESULTADO

HUESO	NO	BUENOS	MEDIANOS	
Radio	2	1	1	Callo exhuberante
Cubito	2	1	1	Callo exhuberante
Humero	2	2		
Tibia	7	6	1	Retardo consolidacion
Fémur	3	3		
TOTAL	16	13	2	TOTAL 16

Caso 8 J P, Natural de Banes masculino, casado, 52 años, raza blanca, jornalero Fractura subtrocanterea del femur con desplazamiento Fue reducida por enclavijamiento intramedular Comienza la consolidacion a las tres semanas Consolidacion a los 60 dias (Fig 8A 8B)

CONCLUSIONES

Primero Que el enclavijamiento intramedular es a nuestro juicio el tratamiento ideal en las fracturas diafisiarias de los huesos largos

Segundo Que es posible adiestrandose bien en la tecnica hacer los casos cerrados, pero si es necesario se puede practicar la reduccion a cielo abierto Esto no produce consecuencias posteriores

Tercero Que es necesario imponerse bien de la tecnica para obtener buenos resultados

Cuarto Que la intervencion en nuestra experiencia hasta el momento actual ha sido inocua

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Editorial

Comments on Meigs' Syndrome*

MEIGS' syndrome as originally described, deals with the association of ascites, hydrothorax and ovarian fibroma. Since then thoracic and abdominal effusions have been found and reported with other forms of pelvic tumor occurring in the female, including multilocular cystadenoma, thecoma, Brenner cell tumor, granulosa cell tumor of the ovary, pseudomucinous multilocular cystadenoma, complex teratoma of the ovary, ovarian and uterine fibromyomata, and papillary cystadenocarcinoma. In a recent review of this condition, Calmenson, Dockerty and Bianco have traced the history of this syndrome from the first case recorded by Cullingsworth in 1879 in which the effusions were present with bilateral fibromata of the ovaries. Nevertheless, Meigs' description of this form of pathology in 1937 emphasized this association, and he deserves the credit of dispelling the discouraging assumption that all cases of pelvic tumor associated with chest and abdominal effusions were necessarily malignant.

Sciorsci's report deals with pelvic tumors associated with peritoneal effusions alone and he suspects that the mechanism of production of the ascites is the same as when the pleural cavity is also involved. He rightly excludes from the discussion cases with concomitant inflammatory disease, or with torsions of the pedicle; and, by the same token, malignancies should also be excluded. The similarity to Meigs' cases is emphasized by the non-recurrence of the fluid after removal of the tumor. The contrast is in the presence of the hydrothorax. There seems to be no definite correlation between the amount of fluid and the duration or character of the pelvic tumor. The causal relation between tumor and effusion is definite; also the precedence of the ascites before the hydrothorax, inasmuch as the reverse of this has not apparently been observed. The chest effusion, as experimentally substantiated, accumulates, probably secondarily, by one-way pathways through the diaphragm.

One case history presented in Sciorsci's report deals with a white Italian girl, 21 years old, who had removed, two years previous to her examination in 1941, a papillary cystadenoma of the right ovary with inflammatory and degenerative changes presumably due to a long pedicle twisted two and a half times. This cyst occupied the greater part of the abdominal cavity and there were 800 cc. of serosanguinous free fluid in the peritoneum. The uterus contained a small intramural fibromyoma which was removed. The contralateral ovary appeared perfectly normal. There were no signs of fluid in the pleurae and at the time of the second operation obvious signs of fluid in the right pleural sac were presented. About 10 days before operation 680 cc. of straw-colored transudate were removed by thoracentesis, in the belief that she had a pleurisy with effusion.

The possibility of a Meigs' syndrome occurred to Sciorsci only at surgery when 1600 cc. of straw-colored transudate were found in the peritoneal cavity while a large cyst of the left ovary was removed. The cyst, 19 cm. in diameter, was reported as a pseudomucinous papillary cyst-adenocarcinoma grade 1 of the left ovary. There was no twist of the pedicle.

Sciorsci rightly suggests the value of nutritional chemical studies in patients with Meigs' syndrome and the relation of the general studies to the nutritional changes in the tumors themselves. With present day views of protein deficiencies and their consequent disturbance of fluid balance, this is a timely suggestion.

Such fluid accumulations have no definite diagnostic or prognostic significance. Of paramount importance, is precise anatomical diagnosis of the various tumors, especially of the ovarian ones, so that there might be no needless sacrifice of ovarian tissue when no malignancy is present.

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* Dr. Abraham O. Wilensky died February 4, 1949, in New York City.

Special Feature

The World Medical Association*

LOUIS H BAUER M D, F A C P

BOSTON MASS

The World Medical Association came into being in Paris, September, 1947 The first *Bulletin* of the Association describes its origin as follows

> "In the darkest days of the Second World War when Britain was the base for allied operations against the enemy in Europe, North Africa and the Middle East, and when Free French, Norwegians Dutch, Czechs and Poles mingled on British soil with Australians, Canadians, New Zealanders, South Africans, Britons and Americans, doctors of many different nationalities found their way to the B M A House in London, the home of the British Medical Association Though soldiers, sailors and airmen for the nonce, most of them had left practices and appointments behind, and their conversations with each other and with the medical staff of the British Medical Association showed to what a great extent practitioners from all parts of the world share common interests, common problems and common ideas
>
> "When the war appeared to be drawing to a close, the officers and secretariat of the British Medical Association considered how these valuable friendships could be maintained and utilized in more normal times, and in the Spring of 1945, they decided to call an informal conference of doctors of different nationalities who were in London at the time, in order to obtain their views on a proposal to create some permanent organization or liaison among the medical profession in all countries The conference was held at B M A House in London, July, 1945 "

Prior to the war, there had been another international medical organization known as the "Association Professionnelle Internationale des Médecins" This organization was largely composed of European countries This organization, naturally, became inactive during the war Its officials were invited to join with the new group

A meeting was held in London, September, 1946 It was then decided to abolish the old organization and create a new one A committee was appointed to find the ways and means In November, 1946, another meeting was held and a preliminary draft of a Constitution and By Laws was made The American Medical Association was represented at the earlier meetings only by observers After the November, 1946 meeting, this organization decided to take part Dr Elmer L Henderson, chairman of the board of trustees, American Medical Association, and myself were authorized to attend the next meeting of the Organizing Committee

This meeting was held in London, April, 1947 It was attended by representatives from Great Britain, Sweden, Belgium, France, Spain, Czechoslovakia, Switzerland, Canada and the United States A final draft of the Constitution and By Laws was prepared and arrangements completed for a plenary session in Paris, September, 1947

This session was held at the headquarters of the Confederation des Syndicats Médicaux Français It was attended by representatives of 45 nations, many of which were represented only by observers The General Assembly adopted the Constitution and By Laws and outlined a program for the ensuing year To quote again from the *Bulletin,*

> "There had come into existence a forum for the exchange of views and the discussion of common professional problems and a voluntary central authority which would be competent to express world professional opinion to official international bodies "

The objects of the World Medical Association as defined in its Constitution are

1 To promote closer ties among the national medical organizations and among the doctors of the world by personal contact and all other means available
2 To maintain the honour and protect the interests of the medical profession
3 To study and report on the professional problems which confront the medical profession in the different countries
4 To organize an exchange of information on matters of interest to the medical profession
5 To establish relations with, and to present the views of the Medical profession to, the World Health Organization, U N E S C O and other appropriate bodies

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* Read before the Thirteenth National Assembly United States Chapter International College of Surgeons St Louis Nov 15 20 1948

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* Dr. Abraham O. Wilensky died February 4, 1949, in New York City.

"Deliberate killing of infirm or feeble minded patients and of children in hospitals and asylums

"The evidence indicates that the so called experiments include

"The effect of vacuum and pressure chambers

"Sterilization — chemical operative and radiological, with controls by artificial insemination

"Blood transfusion

"Cold water immersion with periodic tests and different methods of resuscitation

"Liver puncture

"Deliberate septic infection

"Excision of parts of the body

"Experimental operative surgery—non indicated operations—for instructional purposes

"Exposure to gas and other chemicals for varying periods and results checked by autopsy

"Methods of 'mercy killing' gas, benzene injections cremation of semi moribund individuals, etc '

The German physicians not involved in these crimes were invited to disavow the actions of their criminal associates to expel them from their medical societies and to take steps to prevent a recurrence After much discussion the following vow was adopted by the General Assembly

At the time of being admitted as Member of the Medical Profession

I solemnly pledge myself to consecrate my life to the service of humanity

I will give to my teachers the respect and gratitude which is their due,

I will practice my profession with conscience and dignity,

The health of my patient will be my first consideration,

I will respect the secrets which are confided in me,

I will maintain by all the means in my power, the honor and the noble traditions of the medical profession,

My colleagues will be my brothers,

I will not permit considerations of religion, nationality, race, party politics or social standing to intervene between my duty and my patients,

I will maintain the utmost respect for human life from the time of conception, even under threat I will not use my medical knowledge contrary to the laws of humanity

I make these promises solemnly freely and upon my honor

It was recommended that the above or a similar vow be adopted by the licensing authorities and the medical associations of the world as a prerequisite to licensure or membership

Consideration was given to the preparation of an international code of ethics A committee was appointed to draft such a code and the committee was given directions to divide the code into four chapters covering

1 Obligations of physicians in general
2 Duties of physicians to patients
3 Responsibilities of the physician to the public community and state
4 Duties of physicians to each other

It was also recommended that there be included provisions relative to the behavior of physicians visiting foreign countries

A report entitled, "The Status of the Medical Profession in 23 Countries was adopted This report covers medical man power, registration of physicians professional organization the environment of medical practice, the trend of medical practice and the status of the doctor in all these countries

A preliminary report, "The Advertisement and Sale of Secret Remedies and Appliances' was approved and further study was authorized So far 22 countries have sent in replies on this subject The report shows the presence or absence of control and the character of that control when authorized

Another preliminary report, "Unqualified Medical Practice" was approved and further study directed Fourteen countries so far have submitted reports It is a matter of regret that of the 14 countries replying the United States is one of two countries where there are schools or programs of training for unqualified practitioners A complete report will be issued later

A comprehensive study on "Medical Education" is in the process of compilation It is hoped that this report will be ready in the Spring of 1949

Postgraduate education and the training of

6. To assist all peoples of the world to attain the highest possible level of health.
7. To promote world peace.

The unit of membership in the Association is the national medical association which is most representative of the member country. Each member association is entitled to send two delegates and as many observers as it desires.

After the First General Assembly, 26 nations fulfilled all the requirements of membership. One of these had to withdraw because the government of its country abolished the Medical Association.

At the Second General Assembly, 14 more nations were elected to membership so that at the present time there are 39 nations represented through their national medical association. Others have applied and it is confidently anticipated that within the next two years there will be sixty nations represented.

The countries which are now members are:

Australia
Austria
Belgium
Bulgaria
Canada
China
Colombia
Chile
Cuba
Denmark
Dominican Republic
Ecuador
Eire
Finland
France
Great Britain
Greece
Guatemala
Holland
Hungary
Iceland
India
Italy
Luxemburg
New Zealand
Norway
Pakistan
Palestine-Arab
Palestine-Jewish
Peru
Philippines
Poland
Portugal
South Africa
Spain
Sweden
Switzerland
Turkey
United States

The president of the association is from France; the president-elect from Great Britain; the treasurer from Switzerland; the secretary-general from the United States; the chairman of the council from Canada; the vice-chairman from Sweden and the other members of the council from Belgium, Cuba, France, Great Britain, China, India, Spain and the United States.

Not all nations have a truly representative medical association, which is why some countries are not represented. It is fair to state in this connection that where there is no strong national medical association, health, medical care and medical education are on a distinctively lower level. One of our aims is to foster the development of national medical associations where there are none and to strengthen others, so that they in turn can become active agents in improving medical standards in their countries.

Many may wonder how a medical association can aid in fostering world peace. I believe it can do so very definitely. Doctors have a common meeting ground. They have like aims and ideals. Certainly, if *they* cannot get together, no one can. In April, 1948, the council of the World Medical Association met in New York. Its members saw American medicine and medical education in New York, Chicago and at the Mayo Clinic. It is my firm belief that the members of this group were thoroughly impressed by American medicine and American hospitality. I believe they went home, all as good-will ambassadors to the United States. Much can be accomplished by further meetings and the extension of that good-will to their friends and associates not in the medical profession.

Many momentous decisions were made at the Second General Assembly, held at Geneva, Switzerland, September, 1948.

A report on German War Crimes was adopted. This document prepared by the United Nations gave in detail the crimes committed by German physicians in hospitals and concentration camps. These crimes were classified by the United Nations War Crimes Commission as follows:

"Experiments without consent on human subjects authorized by high authorities on the pretext of scientific research in the interests of war.

"Experiments without consent conducted by medical officials in concentration camps on their own initiative in order to gain experience.

"Deliberate selection of prisoners in camps for subsequent killing, by wilful medical neglect or by lethal injections.

propagated by religious bodies must give way to one of social responsibility that masters must manufacture for men a heaven on earth In this case if the citizens were to rely only on the State, they would have to beware that the guardian angels did not eventually become the secret police."

Had these remarks been made by an American, it would have occasioned no surprise but they were made by a European The particular clause to which these remarks refer was *introduced, again not by an American, but by* a citizen of a country half way around the world. These people are fighting to protect what freedom they have and to regain some of what they have lost. Shall we fail them? We must not.

Other activities of the Association include the publication of a quarterly *bulletin* Committees have been appointed to draft a method of coordinating the medical press of the world and to study medical care and allied subjects

Although only a year old, the Association has made tremendous progress and it is felt that it will rapidly become a powerful force for the improvement of health, the progress of medicine and the promotion of international good-will.

Close liaison has been effective with the World Health Organization so that we may work together and not duplicate each other's efforts. To remove confusion which is prevalent, let me differentiate the two organizations.

The World Health Organization is a branch of the United Nations and represents the governments of the world in medicine, more particularly in the field of public health. Its financial support comes from government funds.

The World Medical Association represents the Medical Associations and the doctors of the world, particularly in the field of medical care and medical education, and receives its support from private funds

The World Medical Association derives its general income from dues paid by member associations. The amount received is insufficient to make the association a functioning body. Some associations are in such financial straits that they cannot pay their dues. Others who can are unable to send money out of their countries. Hence, if the association is to be active, it must seek funds from other sources.

A United States Committee has been organized and incorporated. The objects of this Committee are to assist the World Medical Association in furthering those of its objects which pertain to the promotion of world health world medicine and world peace. The Committee has guaranteed to underwrite the expenses of the World Medical Association in connection with its secretariat, traveling expenses of its Council in attending official meetings (who otherwise could not come) and publication of the *Bulletin*. One of the stipulations was that the secretariat was to be on this side of the Atlantic ocean. This was agreed to and the headquarters of the Association and of the Committee are located in the New York Academy of Medicine, 2 East 103 Street, New York City

We originally estimated that these expenses would be about $50,000 a year. Now, we know they will be about $100,000.

Membership in the Committee is open to every organization and individual in the United States Already hundreds of doctors and laymen and many business and medical organizations have become members. Your own organization has become a generous contributing member May I express the thanks and appreciation of the Committee to your governing body for this.

We desire many thousand individual members. May I express the hope that each of you will become a sustaining member of the Committee. Each member will receive a certificate of membership, the *Bulletin* and all publications of the World Medical Association and the United States Committee. What I trust will be the greatest inducement for you to join, however, is the knowledge that you will be contributing to the advancement of public health, improvement of the standards of medical care and medical education throughout the world and the promotion of international good-will.

The World Medical Association can become an effective organization if it has adequate financial support. Whether or not it succeeds will depend largely upon the doctors of the U. S. The medical profession of the world is looking to us for help. We cannot let them down.

specialists in the different countries is on the agenda for the next year.

A thorough discussion on social security and health insurance took the greater part of the day and a half of the proceedings of the General Assembly. The report finally adopted included a discussion of social security as it exists in various countries; the appointment of a permanent committee on social security to study and keep all medical associations informed of changes in the situation as they develop throughout the world, and the adoption of the following 12 principles whenever medical care is provided as a part of social security:

1. Freedom of choice of physician by the patient. Liberty of physician to choose patient except in cases of urgency or humanitarianism.
2. No intervention of third party between physician and patient.
3. Where medical service is to be submitted to control, this control should be exercised by physicians.
4. Freedom of choice of hospital by patient.
5. Freedom of the physician to choose the location and type of his practice.
6. No restriction of medication or mode of treatment by physician except in case of abuse.
7. Appropriate representation of medical profession in every official body dealing with medical care.
8. It is not in the public interest that physicians should be full-time salaried servants of the government or social security bodies.
9. Remuneration of medical services ought not to depend directly on the financial condition of the insurance organization.
10. Any social security or insurance plan must be open to the participation of any licensed physician, and no physician should be compelled to participate if he does not wish to do so.
11. Compulsory health insurance plans should cover only those persons who are unable to make their own arrangements for medical care.
12. There shall be no exploitation of the physician, the physician's services or the public by any person or organization.

That the 29 countries represented at the meeting could adopt such resolutions is perhaps not to be wondered at in itself, but that they could do so unanimously is little short of marvelous. There were, of course, many arguments and much discussion, most of which was due to language difficulties. The World Medical Association deals in three languages, English, French and Spanish. It is difficult to translate a document from one language into another and have it mean the same thing. Often entirely different wording must be used in order to convey the same meaning. However, after all the language difficulties were ironed out, the resolutions as finally drafted were adopted without a dissenting vote. This is one example of how the doctors of the world think alike.

In adopting the resolution that compulsory health insurance, if adopted, apply only to those persons unable to provide medical care for themselves, one delegate said, "I would like to support the addition of this clause. The association that I represent would regard the inclusion of such a clause as a fundamental necessity, and for this reason, that we regard the exercise of responsibility of the individual as essential for the development of human personality. We hope that the State will not intervene except to provide for the citizen the opportunity to exercise his fundamental rights. We believe that if you deprive the citizen of that social factor you are performing a mental operation which might be described as emasculation and that what you will provide is a mob of mental eunuchs, instead of a group of responsible citizens. I think this is an important point. We hold that if a State accepts all the responsibility of the head of a family that the State is striking at one of the roots of its own strength. If we strike at the root of the family we strike at the root of humanity and civilization.

"We have placed on our agenda for next year, a proposal to add the words, 'to promote peace and human freedom.' I suggest here that the assumption of responsibility and the assumption of control by the State would be an obstacle to human freedom. If we accept such a program we will arrive at a state of social medicine which has been described as follows: The old idea of personal salvation which was propagated by religious bodies must give way to one of social responsibility that masters must manufacture for men a heaven on earth In this case if the citizens were to rely only on the State, they would have to beware that the guardian angels did not eventually become the secret police"

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New Books

The Thyroid and Its Diseases. By J. H. Means, Philadelphia, J. B. Lippincott Company, 1948. The tremendous strides made by medical science in disclosing the mysteries of the thyroid gland during the past decade have necessitated a thorough revision of Means' well-known work, which was first published in 1937. The advent of the goitrogenic agents of the thiourea group of drugs, and newer experimental methods involving the use of radioactive iodine and its isotopes, thyroid explants and the various enzymatic systems, have so increased our knowledge that former basic concepts of thyroid physiology and iodine metabolism have had to be considerably altered or flatly rejected in the light of newer information.

Means has succeeded in bringing his book thoroughly up to date and his presentation is both scholarly and lucid. To round out the text to completeness, special chapters on thyroid tumors and thyroid pathology were prepared by Robson, and Oliver Cope has written one on the surgical aspects of thyroid disease.

In its present form, the work is perhaps the most elaborate and comprehensive of its kind currently available and should find its greatest sphere of usefulness as a reference source to anyone interested in the subject. It should prove particularly useful to physiologists and other experimental workers, but would be of dubious value to busy physicians and surgeons, and even less so to the medical undergraduate, to whom current information of clinical importance is more easily available from more elementary publications.

Blood Transfusion. By G. Bazzocchi and G. Bendandi, Milan, Istituto Sieroterapico Milanese, 1948. This Italian work contains a complete presentation of the clinical aspects of transfusion of blood and blood substitutes. It is thorough and up-to-date and indicates returning activity in Italian medicine after the devastating war years.

Hemostatic Agents. By Walter H. Seegers, Elwood A. Sharp, Springfield, Illinois, Charles C Thomas, 1948. The physiologic hemostatic agents are important among recent developments in surgery. Their worth and efficacy in the operating room is so well established that they now constitute a commonplace weapon in the surgeon's armamentarium.

It is thus fitting that this monograph on the subject should appear at the present time in order to give the reader an understanding of the basic physiologic principles involved in the mechanism of blood-clotting; of the principal agents isolated from these various complex reactions; and finally, of the clinical applications of these substances, leading to the common usage of oxidized cellulose, fibrinogen, thrombin and others.

The material is handled in a logical order and is lucidly presented in a comprehensive manner. None of the common agents used in hemostasis is omitted from the discussion.

Zinsser's Textbook of Bacteriology. By David T. Smith, Donald S. Martin and others, Ed. 9, New York, Appleton-Century-Crofts, Inc., 1948. This classic work on bacteriology has been a favorite text among medical students and public health workers ever since its inception in 1910. While the present edition is very different from the original one, the basic approach to the subject remains fundamentally unaltered: not only are the morphologic and biologic characteristics of bacteria described, but great emphasis is laid upon the host-organism relationship. The latter still remains the vital pillar upon which the therapeutic application of bacteriology rests.

Needless to say, the book has been thoroughly revised and brought up to date in all respects. It follows that extensive discussions on the antibiotics, chemotherapy, viruses and rickettsia—all topics of current interest—are present.

The collaborators, garnered from the faculty of Duke University Medical School, are to be congratulated upon the masterly presentation of the microorganisms of clinical importance. To all medical students and others interested in the subject of bacteriology, this work is enthusiastically recommended.

Neurosurgical Pathology By I Mark Scheinker Springfield Illinois, Charles C Thomas 1948 It is the reviewer's opinion that this new book represents a significant departure from the usual plan adopted in most textbooks devoted to the surgical aspects of neuropathology The traditional approach was to describe the gross and microscopic characteristics of the lesion under discussion to include a brief summary of the clinical features and perhaps to append a simple case report complete with pictures Scheinker, on the other hand has progressed beyond trite ritual and has attempted, to establish a functional, dynamic approach to neuropathology Thus in the presentation on central nervous system injuries, the author has not merely contented himself with an account of the various types of skull fracture and superficial examples of head trauma but has detailed the physiopathologic mechanism and clinical significance of alterations occurring in sites remote from the injured area To quote the author again "It becomes increasingly evident that the diffuse damage to the central nervous system, caused by various stages of reversible vascular disturbances (such as vasoparalysis and vaso thrombosis) bears importantly upon the sequelae of brain and spinal cord injuries' Similarly, he stresses the importance of the histopathologic reaction of the brain tissue surrounding a tumor, which not infrequently has greater prognostic significance than the biologic characteristics of the tumor itself

The subject matter is divided into five general chapters The first chapter deals with cerebral swelling, and the author dispells the popular myth that death following lumbar puncture in cases of supratentorial tumor is due to herniation of the cerebellum into the foramen magnum While this may be true in some cases of subtentorial neoplasms (e g cerebellar lesions) it is not the causative factor in higher lesions Instead the author clearly demonstrates that transtentorial herniation of the brain stem is the true mechanism, while milder degrees of protrusion account for such clinical manifestations as irregularities in pulse and respiration hyperpyrexia and sudden apnea In such cases the author advocates section of the free edge of the tentorium as a life saving measure or establishment of ventricular drainage

Remaining chapters deal with injuries to the central nervous system including an excellent account of the intervertebral disk syndrome tumors of the brain and spinal cord, cerebral suppuration, subdural abscess, and hydrocephalus

The illustrations are clear, of uniform excellence and in number ample to complement the written material

Scheinker's work heralds a deviation from the usual pattern and should meet with a merited success

Preoperative and Postoperative Care of Surgical Patients By Hugh C Ilgenfritz St Louis The C V Mosby Company, 1948 Ilgenfritz has produced a comprehensive working text on pre and postoperative treatment The necessary prophylactic and corrective procedures are based on a knowledge of physiologic principles and pathogenetic factors, which constitutes a rational approach to this subject Illustrations are scanty and chiefly schematic While the prose is clearly written, the style is rather wordy But this does not detract too much from the general worth of the book, and it is recommended as an excellent addition to the library of anyone concerned with the practice of surgery

Abstracts from Current Literature

Cholangiography, C. R. Hughes, J. R. Hannan, and B. E. Mulvey, *J.A.M.A.* **137**:687, June 19, 1948.

The authors, in view of their experience with cholangiography in 90 consecutive patients who had had exploration of the common duct for stone, stricture or stenosis of the biliary tract, emphasize that the procedure is an accurate means of determining the presence or absence of disease in the biliary ducts. Cholangiography is a simple procedure and gives more information than surgical exploration of the ducts. Cholangiography should be employed at time of operation; postoperative cholangiograms will confirm the absence of disease in the duct system before the T-tube is removed. In the authors' series postoperative cholangiography was found to be 93.3 per cent accurate in demonstrating common duct stones not found in previous surgical exploration. Cholangiography at the time of operation can lower the incidence of reoperation for stone or for ductal trauma and prevent stricture due to unrecognized operative trauma.

Avulsion Fracture of Lesser Tuberosity of Humerus. Andreasen, *A. T. Lancet,* 1948, **1**:750.

Avulsion fracture of the lesser tuberosity of the humerus is rare. Andreasen has seen one in well over 25,000 fractures. This was a case of a woman 56 years old who slipped while walking her mount. In an effort to break the fall, she gripped the saddle post with her right hand. With her arm fully abducted above the shoulder, the hand fixed and the body moving, an avulsion fracture of the lesser tuberosity of the humerus developed. The circumflex nerve was injured and hemarthrosis occurred. The patient refused operation. Recovery however was complete except for internal rotation at the scapulohumeral joint.

Roentgenograms fourteen months later showed absorption of the small fragment about the lesser tuberosity and a slight irregularity over the original injury site. It was believed that the fracture occurred in the hyperextended, hyperabducted, and mid-intero-external rotation position, a position in which the subscapularis would contract to its greatest advantage.

Modified Operation for Carcinoma of the Rectum with Preservation of the Sphincter. Altman, Leon S., and Kogut, Benjamin, *Ann. J. Surg.*, 1948, **9**:281.

There is no doubt that abdominoperineal resection done in either one or two stages is the ideal procedure for the majority of patients with carcinoma of the rectum. However there are a certain select number of cases of carcinoma of the rectum in which it is possible to remove the carcinoma and adjacent lymphatic tissue adequately and at the same time maintain intestinal continuity with preservation of the sphincter.

The method Altman and Kogut propose demands three requisites: The lesion must be small, it must not extend beyond the fascia propia, and there must be a mobile sigmoid.

A right paramedian incision is made with the patient in steep *Trendelenburg position.* The abdominal portion of the operation is identical to the usual abdominoperineal procedure. Then a laparotomy pad is placed in the abdominal wound and the patient is placed in the lithotomy position. The anus is dilated manually and a No. 28 Babcock catheter is introduced through the anus to a distance of 8 cm. above the lesion. A suture is placed around the bowel catching the end of the catheter with the suture which is then tied tightly around the gut.

While the assistant guides the bowel from above, it is invaginated through the rectum and out of the anus. This results in an extra-anal intussusception of the lower sigmoid and rectum (intussusceptum) through the anus. This is excised 5 cm. distal to the anus, resulting in removal of the lesion with a portion of normal gut above and below the lesion as well as all gland-bearing tissue. The cut edges are approximated with interrupted sutures going through all layers. The anastomotic site is then reposited through the anus gently. A No. 22 rectal tube is inserted through the anus to a distance of 10 cm. above the site of anastomosis and the tube is anchored to the perianal skin with one suture on each side. A drain is inserted into perirectal space through a stab wound into the ischiorectal fossa.

This procedure permits early discharge from the hospital and perfect sphincter control, and obviates formation of rectal fistulas and strictures.

Alpha-Tocopherol (Vitamin E) in Diseases of the Circulatory System of the Lower Extremities. R. Castagna and G. Impallomeni, *Boll. e Mem. della Soc. Piemontese di Chir.* **18**:155, 1948.

In 7 cases of thrombophlebitis and trophic ulcers of the lower extremities which did not respond to the customary therapeutic measures, massive doses of vitamin E (250 to 300 mg daily) proved very efficient and did not affect the general condition of the patients

The beneficial effect of the vitamins on acute or chronic thrombophlebitis and on trophic ulcers may be attributed either to a direct action on the thrombus, or to a dilatation and new formation of capillaries The danger of embolism must be considered but such a complication has not been noticed by the author Further prolonged observations are required to evaluate this new method

Healing of Bowel as Influenced by Sulfasuxidine and Streptomycin E J Poth J J McNeil, L J Manhoff, W B King and J C Sinclair, *Surg Gynec & Obst* 86 641, June 1948

Controlled experiments were conducted to discover the influence of sulfasuxidine and streptomycin on wound healing in both open and closed or "aseptic" anastomosis Results present additional evidence of the value of sulfasuxidine in preoperative preparation and postoperative care for surgical procedures on the bowel and demonstrate that open technics of anastomosis may be more safely employed when *sulfasuxidine has been adequately administered* Streptomycin administered orally failed to maintain an alteration of the bacterial flora for a sufficient length of time to permit its experimental evaluation in healing of the large bowel When it was given simultaneously with sulfasuxidine, the results were essentially those observed when sulfasuxidine is given alone The difference of healing between the control and treated animals was so striking as to resemble secondary repair in the first instance and primary healing following the alteration of the bacterial flora in the second

Some Uses of Undetached Omentum in Surgery J F Cannaday *Am Jour of Surg*, 1948 2 502

The author cites some surgical uses to which free omental grafts may be put "The ability of a free omental graft to adhere and become viable over a suture line thereby reenforcing and adding an extra layer of tissue probably is the outstanding value of the graft"

Such grafts may be used to cover intestinal anastomoses perforated viscera esophageal suture lines bronchial stumps and as hemostatic tampons in bleeding from the spleen kidney etc Experimentally in dogs autogenous and homologous grafts give equally good results when applied to pleura cut surface and edge of lung tissue, bronchus *esophagus aorta and vena cava* The take was 95 percent in these cases suggesting the clinical use of omentum in thoracic surgery for hemostatic effect, reinforcement of suture lines and replacement of defects"

The author cites the work of O'Shaughnessy who *implanted omental grafts into the pericardial* sac and into the myocardium as well, with gratifying results both experimentally and clinically, in cases of angina

A case report is described wherein the writer successfully dealt with an extensive compound comminuted fracture of both bones of the left forearm with marked skin and soft tissue destruction and grossly infected by means of an omental flap The flap was later detached at its base and returned to the peritoneal cavity

Closed Loop Obstruction of the Ascending Colon with Incomplete Descent of the Cecum, Simulating Acute Cholecystitis E A Gaston, and M E Costin *New England Med Jour*, 1948, 239 705

The authors stress the urgency for early recognition *of acute cholecystitis, and strongly advocate* immediate surgery In this connection they present two case reports of acute closed loop obstruction of the ascending colon in combination with a high riding cecum due to incomplete rotation of the gut which were erroneously diagnosed preoperatively as acute cholecystitis This "diagnostic pitfall—may be avoided if both conditions are kept in mind when acute surgical problems involving the right upper quadrant of the abdomen are encountered" In both cases the constricting lesion was a stenosing cancer in the region of the hepatic flexure

The main factors upon which the differential diagnosis rests are the following the site and type of the obstruction, the relative competency of the ileocecal valve, and degree of descent of *the cecum*

Colonic obstruction due to carcinoma is a slow moving affair as a rule, and most cases are due to lesions of the left colon Patients with a gradually developing obstruction will have chronic complaints unless sudden complete obstruction ensues, producing a *clinical* picture which overshadows the long standing symptomatology The writers point out that chronic obstructions due to gradual stenosis of the colon frequently give rise to dyspepsia sour eructations, and p c distress Such symptoms are often referred to the upper abdomen and may simulate chronic cholecystitis

Only 10 percent of all individuals examined by barium enemas reveal competent ileocecal valves It follows that if the valve is incompetent, **then** acute obstruction of the colon will result in bowel distention But if the valve is functional the distension will be **confined to the** bowel and particularly to the cecum, which may so balloon that there is frequent danger of necrosis and perforation.

When descent of the cecum fails to occur, the organ will be found in the right upper quadrant, and the clinical picture of an acute closed-loop (complete) obstruction may then simulate acute cholecystitis.

Simple flat plates of the abdomen may show a gas filled colon in the right upper quadrant, which would give a clue as to the true nature of the lesion, if the surgeon bears it in mind. But frequently the gas will not show up if the affected segment of bowel has a fluid level. The only absolute method of making an accurate diagnosis preoperatively is by means of a barium enema, and the writers recommend the simple guaiac test as a screening test to indicate which patients with acute surgical abdomens localized to the right upper quadrant would have barium enemas preoperatively. It is assumed positive occult blood will be found in the stool, in cases of acute obstruction due to cancer.

Surgical therapy consists of primary resection, if possible, with end-to-end ileotransverse colostomy, and proximal decompressing ileostomy. Alternatively, the authors mention Lahey's method of exteriorization with an open ileotransverse colostomy. If the cecum is so damaged rendering manipulation impossible, simple cecostomy is adated for temporary decompression.

al Cancer and Preservation of Function,

. Muir, *Brit. Med. J.*, 1948, 8:286.

o single standard operation is suitable for all s of rectal or rectosigmoid cancer. The ideal is the efficient removal of the growth with preservation of normal defecation. A permanent colostomy is not too high a price to pay for the efficient removal of a rectal cancer provided it is essential; it is a heavy burden if it is not. Clinical surgery suggests, and pathology supports the view, that in a number of these cases the internal sphincter is needlessly sacrificed through devotion to a stereotyped operation.

Perfect continence requires an intact anorectal ring. Some rely on the external sphincter for control after proctosigmoidectomy, sutured round the sigmoid colon two to four weeks after resection. A varying degree of control may be obtained from the external sphincter even after it has been divided and repaired; certain continence, however, requires an intact anorectal ring, and since the sense of perception is important, an intact lining to the anal canal. A good abdominal colostomy is probably better than an incontinent or untrustworthy anus.

Miles first stressed the lymphatic spread upward in association with the superior hemorrhoidal artery, laterally with the middle hemorrhoidal vessels, and downward with the inferior hemorrhoidal vessels.

Others have shown that the main lymphatic spread of rectal cancer is in an upward direction, lateral and downward spread taking place only when the lymphatic system above is blocked by growth. Few lymphatic glands over 1 inch (2.5 cm.) below a rectal growth are likely to contain metastases, still less those 2 inches (5 cm.) below; and it would seem to be a reasonable conjecture that a distance of 2½ to 3 inches (6.25 to 7.5 cm.) below a growth is outside its lymphatic spread except in advanced cases.

Furthermore it is well known that adenomas are often found in the neighborhood of a rectal cancer, and two primary growths are not uncommon. The surgeon who performs an anastomotic operation must bear in mind the possibility, however small, of another primary growth developing from an adenoma in the rectal stump, or in the remaining portion of the sigmoid colon. It is probable that the majority of patients would prefer to accept this risk rather than a permanent colostomy, but the presence of numerous adenomas below a high rectal growth should be regarded as a contraindication to the retention of any rectal mucosa and therefore to an anastomotic operation.

A preliminary colostomy is not a routine in all methods. A preliminary transverse colostomy, as advocated by Devine, permits the operation to be perfomed on a non-functioning and, through the use of lavage and sulphaphthaladine, an almost sterile bowel. Necrosis and infection are not only more likely, but are also more dangerous when they occur in functional bowel.

In the author's series, 86 consecutive cases of rectal and rectosigmoid cancer were operated upon since the war. Abdominoperineal or other combined operation, abdominal resection and anastomosis, "pull-through" resection and anastomosis, abdominal resection (Hartmann), and perineal resection (palliative), were employed. There were two deaths.

It was concluded that the end results of operations for rectal cancer which preserve a functioning anus were quite as favorable as those obtained by operations requiring a permanent colostomy, and if a judicious selection of cases is made, there is little reason why the results should not be comparable and a permanent colostomy be avoided in certain cases of rectal and rectosigmoid cancer.

Papillary Adenomas of the Large Intestine
D. A Sunderland and G E Binkley *Cancer*,

From a total of 3356 tumors of the large intestine that were treated on the Colon and Rectum Service of Memorial Hospital (New York) between 1926 and 1946, the authors extracted 48 true cases of papillary adenoma, upon which material they have based a clinical and morphological study.

The authors emphasize the important distinction between papillomas and adenomas "whereas the adenoma is a tumor of mucosal glands, with little if any involvement of the surface epithelium, the papilloma is the reverse—a tumor primarily of the mucosal surface epithelium with resultant secondary glandular changes" Further, adenomas usually are pedunculated, whilst papillomas are sessile Nevertheless, papillomas and adenomas have a common origin, and the writers prefer to employ the term papillary adenoma for villous tumors, rather than papilloma

Of the 48 cases studied, 33 developed malignant change (68 percent of the total)

The incidence of papillary adenomas is low, only 48 cases were found from a total of 3356 (1 4 percent) There is no appreciable sex incidence, and the average age incidence is 62 The most frequent location is the rectum—47 cases

The most common symptoms are bleeding, morning diarrhea and excretion of mucus Also observed are anal prolapse of the mass and anal pain

Treatment consisted in surgical excision of the low-lying lesions Larger ones, and those situated higher up in the rectum were dealt with by means of the cautery snare, supplemented with irradiation When carcinomatous change had occurred, radical resection of the rectum was carried out In two cases, proctosigmoidectomy as described by Bacon was performed, since none of the cases studied showed node invasion, unless the muscular wall of the bowel was involved

The clinical course of these patients was most unpredictable, and the lesion showed marked propensity for local recurrence One may regard these tumors as "midway between a benign adenoma and an adenocarcinoma." After local excision, they may remain quiescent for years, or recur repeatedly as benign growth, or abruptly undergo carcinomatous degeneration.

Because of potential malignancy, it is suggested that all tumors showing bizarre epithelial structure on biopsy, should be removed by radical resection of the rectum—perhaps by a "pull-through" procedure Repeated cautery snare removal or fulgurations are inadequate, unless the lesion is entirely benign, in patients who may be kept under close observation

Errors in the Diagnosis of Acute Appendicitis
P. Recio, *Acta M. Phil* 1948, 5 11

That the diagnosis of acute appendicitis cannot always be made with certainty and paradoxically is pointed out by the author "The more experienced the surgeon, the more difficulties he finds in making a positive diagnosis . . , aware as he is of the numerous pitfalls that lie in wait of the unwary "

Fourteen case reports are presented wherein the preoperative diagnosis was not confirmed by laparotomy After each instance the writer suffixes a pithy comment explaining how the true pathology was overlooked because of inadequate history-taking or examination

The author concludes with the following observations

1. Acute appendicitis does not produce colicky pain; rather it is a severe abdominal discomfort which ultimately localizes in the right iliac region The pain is less severe than that seen in acute pancreatitis or perforated viscus, and there is no accompanying shock.

2 Vomiting is not a conspicuous feature of early acute appendicitis

3 Rebound tenderness is invariably present, if the parietes of the peritoneum are involved

4 The fever rarely goes higher than 38 5°C in acute appendicitis Chills are infrequent

5 Leukocytosis rarely exceeds 18,000 per cubic millimeter.

bowel and particularly to the cecum, which may so balloon that there is frequent danger of necrosis and perforation.

When descent of the cecum fails to occur, the organ will be found in the right upper quadrant, and the clinical picture of an acute closed-loop (complete) obstruction may then simulate acute cholecystitis.

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In Memoriam

JOSEPH L BELLIOTTI

M D, F I C S, F A C S

With the death on October 27, 1948, of Dr Joseph Louis Belliotti the International College of Surgeons, United States Chapter, lost a highly valued Fellow and its Regent for the State of Rhode Island Dr Belliotti was born in Buffalo, New York, where he also received his early education, his medical training was acquired at the University of Buffalo Medical School He served as interne in several Rhode Island hospitals, notably St Joseph's Hospital of Providence, where he became Resident in 1919 He then made his home in Providence, establishing there his surgical practice

Dr Belliotti belonged to numerous societies, among them the American Medical Association, American College of Surgeons, Rhode Island State Medical Society, Providence Medical Association, Malpighi Medical Club of Rhode Island, Association of Military Surgeons of the United States and the Rhode Island Society of Industrial Physicians and Surgeons In 1947 Dr Belliotti was appointed to the Board of Trustees of State Colleges

ROBERT ALOYSIUS GAUGHAN

M D, F A C S, F I C S

The death of an esteemed Fellow of the International College of Surgeons, Robert Aloysius Gaughan, is recorded with regret Dr Gaughan was born in Hazleton, Pennsylvania, and returned there to serve his community as surgeon after his medical education at the University of Pennsylvania, 1913 He served as *Prefector in Surgery in the University of Pennsylvania Post Graduate School* He served his internship in the Hazleton State Hospital, which was followed by a five year residency in the same hospital In 1928 he became Chief Surgeon and served as Chief of Staff until his untimely death in October, 1948 He belonged to numerous societies and was a member of the American Board of Surgery

EDWARD LELAND KELLOGG

M D, F I C S

The field of gastro intestinal ailments has lost one of its most active members through the death of Edward Leland Kellogg Dr Kellogg, chief medical executive officer of the Polyclinic Hospital, New York City, was born in Homer, Cortland County, N Y, and he graduated from the Homer Academy After a year at the School of Social Economics in this city, he decided to make medicine his profession and entered the College of Physicians and Surgeons, Columbia University, from which he received his M D, and the Harzen prize in 1895 The doctor served his internship in Bellevue Hospital, and then was for three years superintendent and resident physician of the Minturn Hospital Later he was consulting surgeon and, for a time, director of surgery in the Gouverneur Hospital, director of surgery in the Manhattan General Hospital and attending surgeon to St Bartholomew's Hospital Dr Kellogg was attending surgeon to the Polyclinic Hospital and professor of surgery in the Polyclinic Medical School when he died at the age of 76

News Notes

Dr. Fortunato S. Guerrero Honored

A fellowship for advanced thoracic surgery by the Quezon Institute has recently been awarded to Dr. Fortunato S. Guerrero. This came in recognition of his native pioneering work in thoracic surgery in the Philippines.

Dr. Guerrero, for the past 20 years and, without benefit of having studied abroad, has explored heretofore unsurveyed fields of surgery in our country. The first total gastrectomy ever performed in the Philippines is credited to him, and is work in biliary, colonic and rectal surgery are of the highest order.

Dr. Guerrero is chief surgeon of the Quezon Institute, professor and head, Department of Surgery, College of Medicine, Manila Central University. He is a chartered Fellow of the Philippine College of Surgeons, Fellow of the International College of Surgeons.

Fourth International Academic Medical Congress, Sao Paulo, Brazil

The Fourth International Academic Medical Congress will take place in Sao Paulo under the honorable presidency of Prof. Renato Locchi, director of the faculty on July 7, in the amphitheatre of the School of Medicine.

Subjects for discussion will be "Children's T.B.," by Jose Freire Gomes; "Feeding Problems in Brazil and Popular Restaurants," Edgard Barbosa Ribas; "Mechanism of the Action of Insulin," Prof. Isaias Raw, and "Considerations in the Use of Internal Medicine," by Olivio Stersa and Nelson M. Rego.

Other subjects to be treated are, "First Stages of Complex TB in its Different Localities," "Streptomycin in the Treatment of TB," and "Circulatory Volicity in the Lobular Skin."

Scientific Gathering of the Academy of Medicine, Seville, 1948-1949

The Royal Academy of Medical Sciences, in order to open cultural relations with the American countries, hereby opens the first gathering exclusively among residents of the Spanish-American countries under the following conditions:

Those participating will be Spanish doctors, druggists and veterinarians in the work of Spain and America.

The rewards will be, first prize 10,000 pesatas granted by the general director of Cultural Relations of the Ministry of External Affairs. Second prize of 5000 pesatas granted by the Institute of Spanish Culture.

The authors of the first two works will receive the right of publication of their works conceded by the School of Spanish-American Studies at Seville.

The Board of Governors of this Academy compose the certified judges of the present gathering.

The authors will send their work to: Secretary of the Academy Plaza de Espana, Torre Sur, Seville. Papers must be in by the first day of October 1949.

CHAPTER NEWS

THE MEXICAN CHAPTER

Prof. Dr. Francisco Grana, F.I.C.S., (Hon.) president of the International College of Surgeons, and Prof. Dr. Carlos Vi Villaron, F.I.C.S., senior dean of the Faculty of Medicine, University of Lima, have been accorded the title of Honorary Member by the Peruvian Academy of Surgery.

Prof. Dr. Manuel A. Manzanilla, F.I.C.S., (Hon.) vice-president of the International College of Surgeons, has been granted the title of Honorary Member by the Society of Gynecology and Obstetrics of Southeast Mexico. His Excellency, the President of the Republic of Cuba has conferred upon Prof. Manzanilla, the position of Dean of the Faculty of Medicine, University of Mexico, and the decoration of the National Order of Merit, "Carlos J. Finlay," in the rank of Official.

Prof. Dr. Jorge de Moraes Grey, Brazil, F.I.C.S., was appointed Dean of Operative Technique and Experimental Surgery of the Faculty of Medicine, Rio de Janeiro.

THE FINNISH CHAPTER

Prof. A. R. Elfving lectured on, "Tumors of the Bladder with Particular Attention Paid to Their Conservative Treatment," at the Chapter's meeting, November 19, 1948 in Helsinki. Prof. Juuso Kivimaki reported on his journey for study in England.

André Crotti, the Surgeon

IT HAS always been my philosophy to say appreciative words about a man while he is still living, and there is no man whom I would rather say them about than Andre Crotti. Our relationship began with the first meeting of the American Goiter Association, 1923, and in the years since then my admiration for him has continued to grow.

It is indeed a privilege to edit this issue of the *Journal of the International College of Surgeons* which is dedicated to a great surgeon—Andre Crotti. Some of the outstanding authorities in surgery in this country and in Canada were invited to contribute to this issue of the *Journal*, but, unfortunately, lack of time prevented several from participating. However, they all expressed their sincere admiration for the man whose work in the surgical field is world renowned.

Dr. André Crotti was born in Buenos Aires, Argentina, Aug. 14, 1873. His parents were M. Charles and Mme. Marie Bisi Crotti. He received his education at the College of Saint Michel, Fribourg, Switzerland, and graduated from there with the degree of Bachelor of Lettres. In 1900 he received his medical degree from the University of Lausanne, Switzerland, and in 1902, after presenting a thesis he was awarded his degree of Doctor in medicine. Following his graduation he became first assistant to Professor Stillings of the Pathological Institute, University of Lausanne, where he remained for about three years. He then became assistant to Professor Roux of the University of Lausanne remaining there for four years, after which time he spent two years as assistant to Prof. Theodore Kocher of the University of Berne.

In 1902, Dr. Crotti was married to Marie Louise Gwynne of Columbus, Ohio, and two children were born to them—Mary Elizabeth, now Mrs. Maurice Gray Buckles, and André Jean, deceased.

Dr. and Mrs. Crotti came to the United States in 1908 and took up their residence in Columbus. Dr. Crotti matriculated at the Starling Ohio College, graduated in 1908, and was licensed to practice medicine in the State of Ohio. He thus began the practice of surgery and has remained in this field since.

In December, 1913, he became a naturalized citizen of the United States of America.

For several years Dr. Crotti held the positions of Associate Professor of Anatomy and Professor of Clinical Surgery, Ohio State University, Columbus. He is a Past Regent of the American College of Surgeons, Ex-President of the International College of Surgeons (1941-42), Past President of the U. S. Chapter International College of Surgeons and recently was made President Emeritus of the International College of Surgeons (1948).

He is a Fellow of the American College of Surgeons, the American Goiter Association, American Association of Obstetricians, Gynecologists and Abdominal Surgeons, the American Medical Association, Ohio State Medical Association, Columbus Academy of Medicine, Columbus Club. He is on the staff of Grant hospital, Mt. Carmel hospital, St. Francis hospital, and he was for many years Staff Surgeon at Children's hospital.

In 1921 he and Mrs. Samuel L. Black, Sr. founded the Columbus Cancer Clinic, and for 25 years Dr. Crotti was the medical director of the Columbus Cancer Clinic, which was the first clinic of that type founded in the United States. In 1948 he was made Medical Director Emeritus of that clinic.

As Dr. Theodore Kocher's assistant Dr. Crotti early became interested in the subject of goiter. With the tremendous amount of material available in his country, he had a splendid opportunity to study all phases of thyroid disease, and it was there that he gathered much of the material and knowledge that later enabled him to prepare his splendid treatise on this subject. He has written extensively on all subjects pertaining to his work, especially concerning goiter and cancer, the most notable being his publication, "Thyroid and Thymus," first published in 1918, revised in 1921 and re-published with extensive revision and additions in 1938 under the title "Thyroid, Parathyroid and Thymus." The scope of this great book was perhaps the most

VERNON GAROLD JEURINK

M.D., F.A.C.S., F.I.C.S.

On July 6, 1948, the International College of Surgeons lost one of its most esteemed Fellows. Born in Kansas, Vernon Garold Jeurink received his medical degree from the University of Colorado in 1927, and settled to practice in Denver, specializing in surgery of the colon and rectum. He held connections with the Children's Hospital, St. Luke's, St. Anthony's and Mercy Hospitals of Denver. In his time he served as Secretary of the American Proctologic Society. Among his society affiliations were the American Medical Association, American College of Surgeons, International College of Surgeons, Colorado State and County Medical Societies and the Midwest Proctologic Society. He also served as a member of the American Board of Surgery.

JOHN M. WILSON

M.D., F.A.C.S., F.I.C.S.

The International College of Surgeons has lost one of its staunchest and proudest members with the death of John M. Wilson, November 1948. Dr. Wilson, born in Grove Hill, Ala., November 18, 1883, served his native state until his death as member and past president of staff of the Providence Hospital, Mobile. He belonged to various state medical and surgical societies, and was a member of the American Association for Study of Goiter.

André Crotti, the Surgeon

IT HAS always been my philosophy to say appreciative words about a man while he is still living, and there is no man whom I would rather say them about than André Crotti. Our relationship began with the first meeting of the American Goiter Association 1923, and in the years since then my admiration for him has continued to grow.

It is indeed a privilege to edit this issue of the *Journal of the International College of Surgeons*, which is dedicated to a great surgeon—André Crotti. Some of the outstanding authorities in surgery in this country and in Canada were invited to contribute to this issue of the *Journal*, but, unfortunately lack of time prevented several from participating. However, they all expressed their sincere admiration for the man whose work in the surgical field is world renowned.

Dr André Crotti was born in Buenos Aires, Argentina, Aug 14, 1873. His parents were M Charles and Mme Marie Bisi Crotti. He received his education at the College of Saint Michel, Fribourg, Switzerland and graduated from there with the degree of Bachelor of Lettres. In 1900 he received his medical degree from the University of Lausanne, Switzerland, and in 1902, after presenting a thesis, he was awarded his degree of Doctor in medicine. Following his graduation he became first assistant to Professor Stillings of the Pathological Institute, University of Lausanne where he remained for about three years. He then became assistant to Professor Roux of the University of Lausanne, remaining there for four years, after which time he spent two years as assistant to Prof Theodore Kocher of the University of Berne.

In 1902, Dr Crotti was married to Marie Louise Gwynne of Columbus, Ohio and two children were born to them—Mary Elizabeth now Mrs Maurice Gray Buckles and André Jean, deceased.

Dr and Mrs Crotti came to the United States in 1908 and took up their residence in Columbus. Dr Crotti matriculated at the Starling Ohio College, graduated in 1908, and was licensed to practice medicine in the State of Ohio. He thus began the practice of surgery and has remained in this field since.

In December, 1913 he became a naturalized citizen of the United States of America.

For several years Dr Crotti held the positions of Associate Professor of Anatomy and Professor of Clinical Surgery, Ohio State University, Columbus. He is a Past Regent of the American College of Surgeons, Ex President of the International College of Surgeons (1941-42), Past President of the U S Chapter, International College of Surgeons and recently was made President Emeritus of the International College of Surgeons (1948).

He is a Fellow of the American College of Surgeons, the American Goiter Association, American Association of Obstetricians, Gynecologists and Abdominal Surgeons, the American Medical Association, Ohio State Medical Association, Columbus Academy of Medicine, Columbus Club. He is on the staff of Grant hospital, Mt Carmel hospital, St Francis hospital, and he was for many years Staff Surgeon at Children's hospital.

In 1921, he and Mrs Samuel L Black, Sr founded the Columbus Cancer Clinic and for 25 years Dr Crotti was the medical director of the Columbus Cancer Clinic, which was the first clinic of that type founded in the United States. In 1948 he was made Medical Director Emeritus of that clinic.

As Dr Theodore Kocher's assistant Dr Crotti early became interested in the subject of goiter. With the tremendous amount of material available in his country, he had a splendid opportunity to study all phases of thyroid disease, and it was there that he gathered much of the material and knowledge that later enabled him to prepare his splendid treatise on this subject. He has written extensively on all subjects pertaining to his work especially concerning goiter and cancer, the most notable being his publication "Thyroid and Thymus" first published in 1918, revised in 1921 and re-published with extensive revision and additions in [illegible] under the title "Thyroid, Parathyroid and Thymus." The scope of this great book was perhaps the most comprehensive volume ever written on thyroid. It remains today one of the outstanding books on the subject. While in some aspects, it may not be in accord with the views of some American authorities, it is so comprehensive and so valuable that no student of this subject can afford to be without it.

Dr. Crotti was never one to favor the iodine deficiency theory as a cause of goiter, but instead has sought to prove that goiter is the result of a fungus. He did a great deal of research work in this field, and the papers which he has presented before the medical profession have always invoked much interest.

As a technician Dr. Crotti has few peers. It has been my privilege to see most of the leading thyroid surgeons on this continent at work, and Dr. Crotti's skill and judgment, his rapidity of dissection and his dexterity is rated with the best.

During World War I, he served as a Major in the United States Medical Corps, 1918–19. He has been decorated by the French, Italian and Polish governments. He resides at 1592 E. Broad St., Columbus, O., and maintains his offices at One S. Fourth St.

At the annual meetings of the American Goiter Association, of which Dr. Crotti is a past-president, we have all profited by the learned discussions which the old master has contributed. Yet one of the qualities I like best about André Crotti is his great capacity for friendship, his loyalty and his devotion to his friends.

Arnold S. Jackson

André Crotti, the Man

I HAVE been requested to speak, in this issue of the Journal of the International College of Surgeons of Dr André Crotti the man

I have known him long and well Having worked together as friends and fellow surgeons, and as pioneer sodbreakers for the International College of Surgeons I know him so well that I want every member of our great organization to see him and understand him as I do

Dr Crotti's physical appearance is striking—tall, erect, with a massive cranial architecture and penetrating eyes Even his characteristic mustache has a personality of its own, as it expresses his moods with the eloquence of Toscanini's baton He is as mild as a spring breeze until aroused by some challenge or injustice, then he becomes a volcano He reacts like the keyboard of a sensitive Steinway to the fine touch of the soft pedal but he responds equally as quickly to a devastating fortissimo when stirred by emotion He never fears combat, he can dip his pen into vitriol as well as into mellifluous ink But once one has his confidence or has proved by his deeds the value of his friendship André Crotti makes a paradise of that friendship Those of us who have been fortunate enough to visit him, and those who have basked in the warmth of his family life will attest to his kindness of heart He is as charming a host as he is a rare connoisseur of the finer things of mundane existence

He is a deeply religious man, but free from prejudice—those who truly love humanity cannot be prejudiced "Give me the man," he often expostulates, "and I do not care where he worships, as long as he worships sincerely " We have often discussed racial and religious problems together, and I find him always magnificent in his anger against those small souls who summarily make religious belief or intensity of skin pigmentation, a basis for prejudice, hate, or discrimination On the other hand, he chooses his associates, social and otherwise, carefully, and is wisely selective as well as deliberative before concluding his course of action

We were walking along the shore of Lake Michigan one evening while I visited him at his summer home It was a starlit night A full moon bathed the countryside in almost unreal beauty Silence everywhere "The mystery of it all " he mused "Divine architecture "

I replied in the words of a Negro poet, a patient of mine, who wrote

Benny Goldblatt kneels in a synagogue to chant solemn praises to a frowning Jehovah flanked by Isaac and Abraham
'Ahmed Tagore lifts his hands at midday to a watchful Allah pointed out by Mohammed
"Samuel Middlebrooks prattles of a Christ Jesus who washed away his sins Samuel Middlebrooks sings loud hosannas to a Holy Trinity at the Wednesday night prayer meeting of the Second Baptist Church
"Wun Chong burns incense to a frozen faced Buddha who keeps his eye on the strength and weakness of all mankind
"Four omnipotent, omnipresent gods
"Which one made me? Or was it any?"

Silence again Crotti broke it "The answer is all around us " "Yes," I retorted, "only a divine genius could have done it " "And a long time before those omnipotent gods were ever spoken of," he added

* * *

I first met Dr Crotti about fifteen years or so ago at the Grant Hospital in Columbus, Ohio, where he still lives and practices We dreamed and worked together for the growth of my brainchild, the International College of Surgeons Dr Crotti labored with me and carried high the torch which I had lit, for he was elected the first president of the United States Chapter, and later, the second international president of the International College of Surgeons While he was president of the United States Chapter, he wrote the *Constitution* which governs the activities of the College, both international and national He founded the Journal, which in this issue honors his work and himself, and he designed the diploma which is given to every member, both the veins may lead to cyanosis, vertigo and epistaxis.

At examination the patient is often distressed, bending the head forward and toward the affected side, especially when swallowing. Gradually a swelling arises corresponding to the thyroid or to the lobe involved. It appears comparatively late owing to the deep location of the gland. It is of moderate size and most frequently hard, but sometimes somewhat elastic. It is tender and may be adherent to its surroundings; it moves up and down during deglutition; palpation may cause neuralgic pains.

The disease may give rise to hyperthyroidism as in *case 1.* It may even simulate exophthalmic goiter. These symptoms will subside when the thyroiditis has been cured. An interesting case has been reported by Bartels, in which thyroiditis developed in a patient with myxedema. The metabolic rate rose to the normal level but returned to the lower values when the thyroiditis regressed. Quite another picture is seen when the swelling of the thyroid gland makes its appearance in connection with some infection, especially influenza or rheumatic fever, when a complete thyrotoxic syndrome may develop within a few weeks (I. Holmgren).

In about 25 percent of cases the acute thyroiditis is reabsorbed, often very slowly; when it is left alone abscess formation most frequently results, and the clinical course is more serious. The symptoms often overlap; the pain increases; the fever continues intermittently; signs of increasing compression associated with stridor arise (Case 5); the skin may be adherent to the tumor and become red (Cases 3 and 5); fluctuation is rarely observed.

The abscess is often located posteriorly (Bothe) and may perforate into the [illegible] ea,
the pharynx, the esophagus (C[illegible]
large vessels, the pleural cavity, or [illegible]
extending into the deep spaces of th[illegible]
into the [illegible] astinum (Case 5). Pe[illegible]
throu[illegible] gives rise to fistulas ([illegible]

Th[illegible] s very favorable in
cases [illegible] s resolution of the
ess. It [illegible] nd heal with a s
suppres[illegible] ular function, or
perthyro[illegible] as has been m

tioned. Besides internal perforations, which often make the prognosis very gloomy, even lead to catastrophe (Case 5), other serious complications, such as edema of the glottis and laryngeal perichondritis, may develop and darken the prognosis.

Differential diagnosis is easy. Hemorrhages in the thyroid gland may give rise to sudden swellings, but the absence of fever makes a mistake impossible. Some malignant tumors grow rapidly enough to resemble an acute inflammation; this is most lucidly illustrated by Billroth's classic case and Hallstrom's more recent one, in which a malignant tumor grew so rapidly that incisions were made to relieve an acuate inflammation. Crotti has mentioned a similar case in which however, the proper diagnosis was made. Further confusion may arise in cases of phlegmons in the neck and in cases of tuberculosis and syphilis. These diseases are too infrequent to fall into the line which counts in this connection.

ACUTE THYROIDITIS: REPORT OF CASES

Case 1: Female, age 47. This woman, 20 years ago, had a goiter which disappeared after treatment with drugs, suffered 10 years later from nervous symptoms. Three weeks before admission to the hospital she noted a swelling on the neck corresponding to the previous goiter.

Examination revealed a firm and tender diffuse goiter which was not adherent. She presented no typical thyrotoxic symptoms, but she was nervous and there was gross tremor. The blood pressure was 160/110. The metabolic rate was plus 18, the sedimentation rate 90. The blood cholesterol was 138 mg. per 100 cc. Urinalysis, blood counts, and the level of nonprotein nitrogen were within normal limits. An x-ray of the neck and chest was normal. A later blood count showed hemoglobin to be 67 percent, red blood corpuscles—4.3 million, white blood corpuscles—4000, neutrophils 56 percent, basophils—2 percent, eosinophils—2 percent, lymphocytes—40 percent and large mono-cytes—2 percent.

During the first si[illegible] eks fever was continuous
at about 101-102 [illegible] thiazole was given (1
m. five times d[illegible] two weeks) without
definite effec[illegible] weeks stay in the
ital, the temp[illegible] ed to normal; also
imentation [illegible] and was 61 when
the hospit[illegible] was still firm but
. The ba[illegible] rate was plus 13.
: In t[illegible] was acute stru-
of [illegible] wn. The patient

had slight thyrotoxic symptoms and a slightly elevated metabolic rate Sulfa drugs were without definite effect, but the disease gradually subsided and the patient was discharged in good condition

Case 2 Female, aged 48 She had a severe dental infection from the third molar in the right mandible, with continuous pus formation sequestration and lymphadenitis even after extraction of the responsible tooth Two months later she suddenly had sharp pain in the right side of the neck, irradiating to the right mandible dysphagia and probably fever Furthermore, a swelling was observed on the right side of the neck Later the symptoms moved to the left side

Examination gave essentially negative results except for a sedimentation rate of 102 and a moderate diffuse swelling of the left thyroid lobe which was firm and tender It seemed to be adherent to the sternocleidomastoid muscle The temperature was within normal limits The blood pressure was 125/70, the blood calcium 11 2 Blood counts showed the hemoglobin to be 65 percent red blood corpuscles—3 8 million and white blood corpuscles—4,900 An x ray of the chest and neck gave negative results Penicillin was given, whereupon the symptoms subsided At discharge the left thyroid lobe was still slightly tender

Comments In this case acute thyroiditis was present and it was obviously due to a dental focal infection It was of the migratory or creeping type, starting in the right lobe and later moving to the left Treatment with penicillin had a prompt and favorable effect

Case 3 Female, age 29 She had had an abortion 10 days before and in the last four days had suffered from pain, some dysphagia and a swelling on the neck On admission a diffuse, tender goiter was observed with some reddening of the skin The temperature was 102 F Blood counts showed a hemoglobin percentage of 71 red blood corpuscles—3 8 million and white blood corpuscles—5 600 The sedimentation rate was 107 An x ray of the chest was negative After some days of treatment with sulfadimin (1 gm three times daily) the temperature was normal and the tenderness decreased She was discharged in good condition with a sedimentation rate of 40

Comments In this case also the cause of the acute thyroiditis was not clear It may have been due to the abortion, but this seems rather unlikely as the patient did not suffer from any pronounced puerperal fever The thyroiditis subsided promptly in response to sulfa therapy

Case 4 Female, age 33 For two weeks she had suffered from febrile rhinitis and a sore throat A week later she had a cough, slight dysphagia, swelling and tenderness of the right side of the neck The temperature was 100 9 F She had been treated with sulfathiazole (5 gm twice daily) and hot wet compresses At entry she presented a firm tender swelling the size of a pigeon s egg corresponding to the right lobe of the thyroid The metabolic rate was plus 8 the sedimentation rate—65 The blood pressure was 115/75 An x ray of the neck and chest revealed no abnormality The symptoms subsided and she was discharged in good condition with a very small rather than enlargement of the right thyroid lobe The sedimentation rate was 60

One month later she was still in good condition with no demonstrable goiter and a sedimentation rate of seven

Comments In this case acute thyroiditis followed an acute infection in the upper part of the respiratory tract The disease subsided spontaneously but the cure may have been due to the sulfa drugs administered previously to control the respiratory infection

Case 5 Female age 36 This woman for slightly more than a week had been suffering from increasing dysphagia and a rise in temperature, which was around 104 F She also had some dysphagia and a tenderness of the neck

On admission she had a tender, firm swelling corresponding to the thyroid gland with some reddening of the skin She had several chills with a rise in temperature to 107 1 F An incision was made to the thyroid gland but failed to reach pus or a more pronounced edema An energetic treatment with sulfathiazole (1 gm six times daily and Lugol s solution) was instituted On the following day acute difficulties in respiration with cyanosis were overcome by means of oxygen given thru a nasal tube, a slight stridor persisted Four days later there was a hemorrhage and some discharge of pus from the pharynx was noted As the stridor and also the swelling and tenderness of the neck increased, intubation was attempted Because of a sudden stridor a tracheotomy was also attempted, during these procedures which met with the greatest difficulties she died

Autopsy revealed abscesses in the right thyroid lobe one especially large cavity presented itself with perforation to the esophagus Furthermore, there was a phlegmonous mediastinitis A large amount of pus was found in the trachea and in the large branches of the bronchi

Comments In this case of acute suppurative thyroiditis the cause was also obscure It was a severe condition and the sulfa treatment did not succeed because the incision failed to find the pus and provide a sufficient outlet For this reason the abscess perforated posteriorly, obviously in part thru the pharynx. At the same time the process progressed into the mediastinum.

CHRONIC THYROIDITIS

More variegated and complicated are the diagnostic problems relating to chronic thyroiditis. Analyses have been made of clinical charts and of the pathologic features in order to outline the setting of the different types, i.e., the Riedel type, the Hashimoto type, the de Quervain type and the chronic simple form. The results of these attempts are not convincing, and opinions differ.

Sudden onset has been reported (Braendstrup—Case 5—de Courcy) but is extremely rare. The disease may appear in any age group but is most frequent between the ages of 30 and 60. The onset may be insidious; the symptoms are few and vague. Some discomfort of the neck sets in. Then a slowly growing goiter appears spontaneously and gradually gives rise to pressure symptoms, with respiratory difficulties, cough and hoarseness. The last mentioned symtom may also be due to paralysis of the recurrent nerve; the dyspnea may occasionally require a trachectomy (Grolitsch). Sometimes neuralgic pains set in, irradiating to the homolateral ear and shoulder, or to the trunk. In a very few instances the condition has occurred without any noticeable goiter.

The goiter itself is hard and smooth, or it may have a diffuse, pebbly feel (Ficarra); in the later stages and in the pressure of extracapsular extension it is strongly adherent to the surroundings. The Hashimoto type is claimed to be without adhesions.

Hypothyroidism or hyperthyroidism may follow. Silght thyrotoxic symptoms were observed in 25 to 30 percent of the cases described here. and a picture resembling exophthalmic goiter has been met with in *Case 7* and *8*. (Braendstrup. Case. Gurkan. Hori, Rosen). There was a thyrotoxic picture with a considerable rise in the metabolic rate and a typical iodine response. Also a slight myxedema has been described (Ficarra, Haakon Rasmussen).

A case is on record (Reinhoff) in which the cirrhosis involved aberrant thyroid tissue situated in the supraclavicular fossa.

Recurrences of the cirrhosis are very rare, but cases have been reported (McClintock and Wright, Hertz, Heyd, Perman and Wahlgren, Rosen, Roulet, Schilling). The disease usually takes a benign course and the prognosis is favorable.

As will be evident from what has already been stated, the clinical diagnosis may be extremely difficult, as a gradually increasing, hard, smooth goiter, adherent to its surroundings may suggest many different lesions, e.g., cancer, tuberculosis, syphilis, lignous phlegmon, Hodgkin's disease or simple calcified adenomatous goiter.

A sedimentation rate which is normal or but slightly elevated, as well as a good general condition and the absence of metastases, may be of some aid. Negative results from the Wassermann test will rule out syphilis. A calcified adenoma is easily excluded by means of a roentgenogram. In cases of simple subacute thyroiditis only about five percent of a tracer dose of radioactive iodine is taken up (Crile, Jr.).

Consequently the old and eternal Chinese proverb, "a hundred hearings do not equal one seeing" holds good even here; in this intricate diagnostic puzzle, in which the paramount problem is to exclude cancer, it must be considered justifiable to resort to *seeing,* e.g., to an aspiration biopsy. The risk, chiefly emphasized in connection with biopsy is that it may aggravate the possible cancer, causing dissemination and formation of metastases. This risk has been highly overestimated (Engelbreth Holm); and even these objections do not exist as far as an aspiration biopsy is concerned.

The only real objection is the progression of a possible cancer through the tiny break made by the punch in the capsule of the tumor, and even this risk is exaggerated. If a cancer is to be present, treatment may be instituted accordingly and the risk eliminated; if the tumor is non-malignant the risk does not exist at all. Aspiration biopsy performed by means of Christiansen's rotating punch is a timesaving, safe and reliable procedure to obtain material for histologic examination when the immediate diagnosis is urgent. If Christiansen's rotating needle is not available, ordinary 18 gauge nee[illegible] and a record syring will be entirely suffic

Practical experience also fails to show any alteration in the clinical behaviour of the tumor in cases in which malignancy has been ascertained (Hayes Martin Memorial hospital, N Y) On the other hand a real problem may arise from the difficulties in making the diagnosis even histologically (Graham) At operation also the diagnosis may be very difficult The consistency of the goiter the white spotted surface and adhesions all indicate cancer A histological examination by means of frozen section at operation may be an aid But the results obtained by a preliminary aspiration biopsy are far more reliable Besides harmful surgical intervention is thus avoided which is also important

CHRONIC THYROIDITIS REPORT OF CASES

Case 6 Male age 62 This man for 15 years had suffered from a goiter which had increased rapidly during the last three weeks of admission An ulceration had appeared There had been no complaints referring to compression He had been treated with x rays in another hospital

Examination revealed a left sided nodular goiter the size of two fists with two ulcerations on the skin (Fig 3) He presented no thyrotoxic symptoms and the basal metabolic rate was plus 12 The larynx was felt to be highly dislocated to the right The sedimentation rate was 18, the blood calcium 10 3 the blood phosphorus—3 8 An x ray of the neck showed a dislocation to the right of the trachea with a considerable compression the lumen being only 5 mm in diameter Three biopsies failed to demonstrate malignancy or specific inflammation (Reuterwall) but revealed granulation tissue and firmer fragments consisting of epithelioid elements, fibroblasts and a considerable number of *phagocytes*

A large number of foreign bodies obviously crystals of cholesterol, were further observed and in connection with these foreign body giant cells (Fig 1) Some necrotic parts were found, partly infiltrated with leukocytes The treatment was confined to incisions and scraping of the foci after which procedure the temperature rose to 101 8 F

Chemical analysis showed the pus to contain 1 01 percent cholesterol Sulfathiazole (1 gm three times daily) was administered and the temperature subsided More extensive surgical treatment was intended but the patient failed to return Eighteen months after discharge he was still in good condition

Comments In this case there was fistulous thyroiditis of undetermined origin Obviously there was no question of a malignant tumor, as several biopsies failed to reveal malignancy and the course had been a benign one Scraping of the foci brought about cure, at least temporarily The microscopic picture was rather peculiar revealing an inflammation with foci of granulomas containing a considerable amount of cholesterol Chemical analysis also revealed a large amount of cholesterol in the pus

Fig 3 Thyroiditis with fistulas (Case 6)

Case [illegible] Female age 59 She was admitted with a clinical picture closely resembling that of exophthalmic goiter, with a fine tremor, nervousness perspiration loss in weight (5 kg) and loss of hair For years she had noted a slight goiter and some dyspnea when walking

Examination revealed a moderate goiter, a blood pressure of 135/80 and a basal metabolic rate of plus 82 The sedimentation rate was 11 Urinalysis blood counts and x ray of the chest revealed no abnormality After preoperative iodinization, with a fall in the basal metabolic rate to plus 30, a subtotal thyroidectomy was performed The removed gland did not present the picture of typical thyrotoxic goiter, but contained larger and smaller foci which were interpreted as foci of regression

The microscopic specimen (Wilton) showed thyroid tissue with enlarged follicles covered by a low epithelium Numerous foci were revealed consisting of epithelioid cells, with a few giant cells of the Langhans type and some infiltration with lymphocytes (Fig 4) No necroses were demonstrated

The examination failed to reveal tubercle bacilli. The vessels presented a pronounced calcification of the Monkeberg type in the media. No changes resembling exophthalmic goiter were demonstrated. Considering the postoperative course, the military foci may be interpreted as allergic tissue reactions. Six days postoperatively there was a swelling of the forearms and the hands, with pain and a temperature of 102.9 F., and an increase in the sedimentation rate to 62. The blood calcium was 11.3. Blood counts showed a hemoglobin percentage of 75, red blood corspuscles—4.4 million, white blood corpuscles—8,000, polynuclears—70 percent, eosinophils—1 percent, basophils—1 percent, lymphocytes—25 percent and monocytes 3 percent.

An x-ray of the hand was normal; x-ray of the lungs revealed some calcified primary complexes but no miliary dissemination. The symptoms subsided gradually in six weeks. At discharge she still had some swelling, especially corresponding to the metacarpophalangeal and the finger-joints, with some rigidity of the fingers. She was discharged in rather good condition with a basal metabolic rate of plus 1; the sedimentation rate was 30.

Comments: The condition in this case was interpreted as exophthalmic goiter and treated accordingly, was actually pseudo-tuberculous thyroiditis of the type described by de Quervain. A striking feature was the postoperative complication resembling primary chronic polyarthritis; the cause was unknown, but the possibility of allergic reactions cannot be excluded. Chronic polyarthritis developing some months after thyroidectomy has been described by Kirstein and Lovgren, who observed this complication in no less than 25 percent of 150 thyroidectomies.

In one case, Pedigo and Abramson have observed acute exacerbation of polyarthritis after thyroidectomy for a lmyphadenoid goiter.

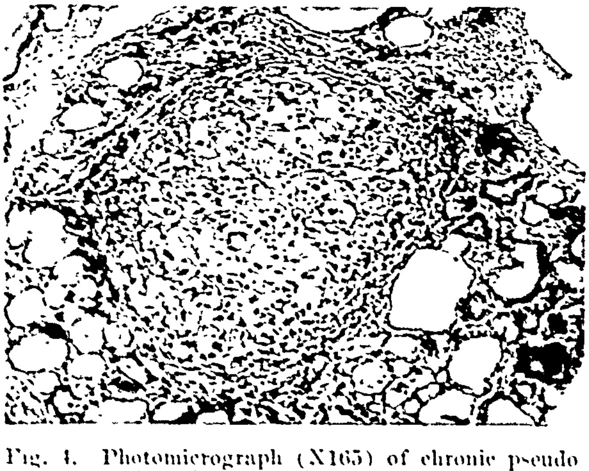

Fig. 1. Photomicrograph (X165) of chronic pseudo tuberculous thyroiditis (Case 7).

Case 8[*]*:* Female, age 20. For six years she had a moderate goiter. The symptoms, which had increased during the last four months, consisted in slight dyspnea, nervousness, perspiration, tachycardia, some dysphagia and gross tremor. Pronounced dermographism was also present. At entry she presented a slight diffuse goiter. She had lost 12 kg. in weight. The metabolic rate was plus 40. The blood pressure was 125/65, the sedimentation rate—4 and the blood calcium—11.6. An x-ray of the chest and neck was normal and so was the electrocardiogram. The condition was interpreted as thyrotoxicosis; a subtotal thyroidectomy was performed after a preoperative iodinization with a fall in the basal metabolic rate to plus 19.

The postoperative course was uneventful, and she was discharged in good condition with a metabolic rate of plus 1. Two years later she was still in good health.

The microscopic specimen (Santesson) showed dense fibrous tissue with several blood patches of lymphocytes and plasma cells intermingled with thyroid epithelium. In several places, degenerative alterations were observed with destruction of the follicles. The follicles were of irregular shape and different sizes. Some larger follicles were observed in areas resembling adenomas. The epithelium was low cuboidal or low cylindric, but nowhere was it high cylindric. No lymphoid foci were demonstrated (Fig. 2).

Comments: In this case chronic thyroiditis (cirrhosis) was of several years' standing. It developed as typical thyrotoxicosis, with all the classic symptoms except exophthalmos, and was treated accordingly. There was a typical iodine response. Also the operation was performed according to that view. Microscopic study revealed the condition as cirrhosis resembling the Riedel type.

TREATMENT

The management of acute conditions of the thyroid gland profits by the new and most effective weapon given us in the sulfa drugs, penicillin, streptomycin and perhaps also aureomycin. Acute simple thyroiditis will often respond to a therapy consisting of confinement to bed, application of hot, wet compresses and chemotherapy with the aforementioned drugs. This treatment, if desired, may be supported by administration of oxygen (Womack).

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[*] Besides this case, the author has previously published some illustrative cases on thyroid cirrhosis 16.

In a few instances, however, these drugs seem to be entirely without effect (Bartels, Derbyshire and Gray). In some of the cases (Case 2 and 3) chemotherapy had a promptly favorable effect, and the comparatively early *spontaneous* disappearance of the thyroiditis in another (Case 4) may be due to the previously instituted sulfa treatment.

In *case 1* the condition did not respond to sulfa therapy; in *case 5* the sulfa drugs were evidently without any effect at all because the incision failed to evacuate the abscess, and the process could never have been brought under control unless a sufficient outlet for the discharge had been obtained

Inspired by the wave of enthusiasm following the inauguration of thiouracil in the treatment of thyrotoxicosis, King and Rosellini made an attempt to introduce this drug in the management of acute thyroiditis, in which the sulfa drugs have met with only slight success or with none at all. King and Rosellini even claim thiouracil to be a specific for acute thyroiditis. Lack of personal experience in this kind of treatment renders it impossible for the author to take any definite stand as to the efficacy of thiouracil in the treatment of these conditions.

The theoretic basis for its use seems rather obscure. The beneficial action of thiouracil is possibly due to its interference with the formation of colloit as the presence of which is considered responsible for the foreign body reaction.

The cases reported in King and Rosellini's publication also fail to convince one of the superiority of this therapy; the resolution in these cases of moderate thyroiditis began about a week after the institution of thiouracil. They have not attempted treatment with penicillin which seems to be more rational. Further experiences will have to be published before a definite evaluation of the thiouracil treatment is possible.

King and Rosellini also consider a diagnostic puncture desirable in order to ascertain the kind of bacteria responsible for the disease. This leads to another question: the therapeutic puncture with subsequent injection of penicillin combined with a general chemotherapy. In some few instances this treatment may be sufficient, as in the case reported by Torina and Caroccio. In Rischel's case of an abscess caused by Bang's abortus bacillus punctures without any supplementary chemoterapy brought about cure Generally it would be a mistake to rely upon this procedure.

On the other hand, the eternal fundamental law of the surgery of ancient times, "ubi pus, ibi evacua," holds good also for suppurative thyroiditis Surgical intervention must be resorted to, quickly and energetically. Two ways out present themselves; the abscess may be opened and drains introduced, a method proved sufficient in a number of cases (Berri, Bonney, Lambert Rogers, McQuillan and Breidenback). This procedure is not the treatment of choice. In most cases the outlet will be insufficient and the abscess will progress, possibly into the mediastinum, a grave consequence (Case 5). Total extirpation of the lobe involved will provide a sufficient outlet for the discharge, especially in cases of multiple abscess (Clute, Crotti, Hertz, Kocher). Consequently, this is my method of choice even if some technical difficulties are encountered, for these can be overcome.

The operation may be performed with local anesthesia, without depots on the superior thyroid artery; however, general narcosis by means of an intratracheal tube is preferable. If such a tube is not available, general narcosis should not be used on account of the risk of aggravating a possibly pre-existing stridor. Surgical treatment must, of course, be supported by adequate chemotherapy.

In cases of fistulous processes, scraping and drainage may give an excellent immediate result (Case 6). But even this procedure must be followed by a more extensive operation, that is, hemithyroidectomy.

In the management of cirrhosis, emphasis must be placed on relief of the mechanical effects of the goiter. For this reason, and perhaps also because, malignancy is suspected, treatment must be surgical even if it is empiric and unsatisfactory (Crile, Jr.).

If the diagnosis has been established by means of a punch biopsy the operation need not be a very radical one. Especially when the patient is in a hypothyroid stage, the less subnormal tissue removed the better. It is claimed to be advisable to give x-ray treat-

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Fig. 4

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Data on Eight Cases of Thyroiditis

Case	Sex	Age	Diagnosis	Origin	Clinical Features	Sedimentation Rate	Hyperthyroidism	Treatment	Response to Chemotherapy	Result	Special Features
1	F	47	Acute simple thyroiditis.	Undetermined	Firm, tender goiter; continuous fever	90	Slight (metabolic rate plus 18)	Sulfathiazole	Uncertain	Cure	Pre-existing goiter.
2	F	48	Subacute simple thyroiditis.	Dental focal infection	Dysphagia; sharp pain; goiter moves from right to left side.	102	None	Penicillin	Good	Cure	Migratory or creeping form of cirrhosis.
3	F	29	Acute simple thyroiditis.	Undetermined	Pain; slight dysphagia; fever; tender goiter; reddening of the skin	107	None	Sulfadiamin	Excellent	Cure	
4	F	33	Acute simple thyroiditis.	Rhinitis	Fever; tender right-sided goiter	68	None (metabolic rate plus 8)	Sulfathiazole previously	Uncertain	Cure	
5	F	36	Acute suppurative thyroiditis.	Undetermined	Dysphagia; fever; tender goiter; reddening of the skin; Stridor.	—	None	Incision, which failed to reach pus; sulfathiazole.	None	Death	Autopsy revealed mediastinitis and an abscess in the thyroid gland.
6	M	62	Fistulous thyroiditis.	Undetermined	Increasing goiter; later fistulas.	18	None	Incision and scraping		Cure, at least temporarily	Cholesterol containing pus; cholesterol granulomas.
7	F	59	Chronic thyroiditis (giant cell type).	Undetermined	Thyrotoxicosis giving typical iodine response	11	Marked (metabolic rate plus 82)	Thyroidectomy		Cure	Pseudotuberculous picture revealed microscopically Bacilli not demonstrated; postoperative complication resembling polyarthritis.
8	F	20	Chronic thyroiditis (fibrous type)	Undetermined	Thyrotoxicosis giving typical iodine response	4	Marked (metabolic rate plus 40)	Thyroidectomy		Cure (metabolic rate plus 1)	Cirrhosis (Riedel) revealed microscopically.

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SOMMAIRE

Apres une étude brève de faîts historiques par rapport à la thyroïdite, l'auteur décrit la fréquence de cette lésion. L'étiologie et la pathologie de ces maladies sont mentionnées Dans un cas, il y avait une inflammation caractérisée microscopiquement, par une grande quantité de cholestérol. Un rapport compréhensif des symptômes et des problèmes diagnostic est donné.

La signification de l'importance de la biopsie aspiratoire est notée avec emphase et cette methode est hautement recommandeé. Le traitement est aussi discuté, Une simple thyroïdite aigüe sera traiteé essentiellement par chémothérapie et dans quelques cas de suppuration le traitement consistera dans la ponction avec injection de penicilline. Le traitement dans la plupart des cas de thyroïdite suppurative aigüe consiste en incision et drainage, quoique souvent il faille enlever la glande pour prévenir de dangereuses complications, surtout l'extension dans le mediastin. Aussi dans le cas de cirrhose thyroïdienne, le traitement consiste en thyroïdectomie, simplement pour soulager les symptômes sérieux de compression.

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Evaluation of the Present Treatment of Hyperthyroidism*

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DURING the past decade, two developments in the field of thyroid research have proved to be of far-reaching significance, namely, the discovery that the function of the thyroid gland can be suppressed by goitrogenic drugs, notably thiouracil and related compounds, and the demonstration of the value of radioiodine as a tool for study of thyroid function as well as a therapeutic agent in the treatment of some types of thyroid disease. By opening new approaches to thyroid investigation, these agents have been responsible for rapid and sound advances in our knowledge of the physiology of the thyroid gland, and both have contributed greatly to the effectiveness of the treatment of hyperthyroidism.

These developments have been spectacular and have been enthusiastically received by the profession. However, it is evident that these advances have not provided the final solution to the problem of goiter, nor has effectiveness of treatment yet reached the stage whereby established methods of treatment can now be discarded.

It is the purpose of this discussion to review our clinical experience with these agents at the Mayo Clinic, as well as the experience reported by others, and to attempt to evaluate their use in the treatment of hyperthyroidism.

GOITROGENIC COMPOUNDS

For many years it has been known that certain substances would produce enlargement of the thyroid gland in animals, but it was not until 1941, after the studies of several investigators, notably Mackenzie, Mackenzie and McCollum,[1] Ritcher and Clisby,[2] Kennedy,[3] Griesbach and Purves,[4] and Astwood, Sullivan, Bissell and Tyslowitz,[5] that any progress was made in determining the mechanism by which sulfonamides and thiourea induce enlargement of the thyroid and reduction of its function. After the publication of Astwood's[6] report in 1943 on the control of hyperthyroidism in three cases of Graves' disease by treatment with thiourea in one case and with a related substance, thiouracil, in the other two, thiouracil became available to many investigators for use in treatment. Soon reports confirming the effectiveness of the drug were published.

Studies with radioiodine on animals treated with thiouracil followed. Thus Larson and his co-workers[8] showed that the drug prevented all but small amounts of iodine from entering the gland. Rawson and his associates[9] found that the drug prevented proper utilization of iodine by the thyroid gland but that in spite of this action iodine, in large amounts, produced involution of the gland. Other studies, many of them involving the use of radioiodine, indicate that although iodine may be trapped by the thyroid under the effect of thiouracil, thyroid hormone is not formed.

The dramatic response of patients with hyperthyroidism to treatment with thiouracil led to use of the drug as a measure for preparing these patients for surgical treatment in some clinics, and as total treatment in others. When such treatment was used as the sole preparatory measure, incredibly annoying bleeding was encountered at operation which increased appreciably the technical difficulties of the operation. This problem was partially solved when it was learned that the administration of iodine, either during the preoperative period of preparation with thiouracil or for a period of two weeks prior to operation, would induce involution of the gland without interfering with the antithyroid action of thiouracil. Indeed, the use of iodine in many such cases results in a further drop in basal metabolic rate.

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It was soon discovered that the use of thiouracil was not without danger, for not infrequently toxic effects became manifest. Of these the most serious was agranulocytosis which occurred in about 2.5 percent of many reported series. It became apparent that the drug should be used cautiously and only when the patient under treatment could be kept under constant medical supervision. The introduction by Astwood and Vander Laan[10] of propylthiouracil (a compound less toxic than thiouracil) stimulated increased interest in this form of therapy.

While propylthiouracil is far superior to thiouracil for the treatment of hyperthyroidism, it is not free of toxic side effects, for the occasional occurrence of minor reactions requiring the discontinuance of the use of the drug[11] has been reported and at least two instances of agranulocytosis have been charged to it.

Several investigators have employed thiouracil or propylthiouracil as total treatment in the hyperthyroidism of Graves' disease. Although complete remission of hyperthyroidism in most cases can usually be induced in two to three months and apparently maintained as long as administration of the drug is continued, the incidence of recurrence of the disease after withdrawal of the drug is high. Thus, Williams[12] reported that two weeks to five months after administration of the drug was discontinued, 51 percent of his patients had had relapses. In a series of 17 cases reported by McCullagh and his associates,[13] the disease recurred in six, or 35 percent, in one week to 14 months after the withdrawal of the drug.

The high incidence of recurrence after treatment with goitrogens, the difficulty in keeping patients under prolonged observation and the occurrence of occasional untoward reactions, even from use of propylthiouracil, are the factors that have influenced us to confine the use of the drug as total treatment for hyperthyroidism to the occasional, unusual case in which no other form of treatment seems adequate or feasible. Furthermore, the relatively small but significant incidence (four to six percent), of malignant lesions in nodular goiters definitely contraindicates the employment of any nonsurgical method as total treatment for hyperthyroidism associated with adenomatous goiter.

As a measure of preparation for operation, propylthiouracil used concurrently with iodine has been valuable in reducing the operative mortality in those cases in which the patient is a poor surgical risk because of the severity of the hyperthyroidism or because of the presence of complications. The question arises whether there are reliable criteria by which the safety of the operation on patients with toxic goiter prepared by medication with iodine can be accurately judged. An analysis of the potential hazards associated with the surgical treatment of these patients reveals that they fall in two main groups:

1. The normal hazards inherent in any surgical procedure, such as those connected with operation on patients with nontoxic goiter. These are limited, for the most part, to technical errors.

2. The additional hazards incident to hyperthyroidism. These additional hazards in turn may be divided into two subgroups: (a) those associated with the development of an overwhelming postoperative hyperthyroid crisis, usually confined to cases of severe hyperthyroidism and (b) those related to the debility of the patient that results from the intensity of the disease, long-continued hyperthyroidism, advanced age or intercurrent disease.

On the basis of these potential hazards is it possible to gauge, with a reasonable degree of accuracy, the surgical risk for the patient with toxic goiter? As previously reported,[14] an attempt to determine this point was made by correlating the mortality with the previously recorded ratings of the hazards in a large number of patients with toxic goiter prepared with Lugol's solution. The grading of the operative risk was made on the basis of 1, 2, 3 and 4. The normal risk of the patient with nontoxic goiter was graded 1, and the normal risk of the patient with toxic goiter was graded 1+. The estimation of any additional hazard was added to the normal rating.

This survey illustrated that while it is not possible to foretell which patient will not survive the operation, it is possible from the clinical estimate of the hazard to select a small group of patients whose ratings are adjudged moderately or greatly increased and from which 81 percent of the mortality will be derived

The time required for effective preparation with goitrogenic drugs, of the patient who has Graves' disease, is two or three times greater than that needed for adequate preparation with Lugol's solution The goitrogenic drugs are potentially toxic and since the operative risk in cases of mild or moderate severity, in which the patient is prepared with Lugol's solution is no greater than it is in cases of goiter unassociated with hyperthyroidism, it is our practice to confine the use of propylthiouracil to the cases of severe or complicated disease The results of surgical treatment of patients with toxic goiter prepared as outlined have been excellent

Thus, at the clinic in a recent series of 455 consecutive cases of exophthalmic goiter, in which thyroidectomy was performed there were no deaths In a similar series of 334 patients who had adenomatous goiter associated with hyperthyroidism, and who were operated on during the same period, two patients died The mortality rate for the combined groups, comprising all the cases of hyperthyroidism, was only 0 25 percent (table 1) Subtotal thyroidectomy was performed as a single stage procedure in all the cases of exophthalmic goiter and in all but three of the cases of adenomatous goiter In all these three cases technical difficulties, rather than inadequate preparation of the patient, constituted the factor which influenced the decision to perform the thyroidectomy in stages

Data regarding the number of patients to whom the goitrogenic drug was administered are not readily available, but it is estimated that the number did not exceed five percent of the patients operated on Those patients who were prepared with propylthiouracil for operation were, as a group, patients who were severely hyperthyroid, or who had complications which were being adversely affected by hyperthyroidism In such cases prolonged periods of preoperative preparation seemed justifiable and the complete control of hyperthyroidism before operation was undoubtedly an important factor in the absence of mortality in the group In rare cases toxic manifestations of the drug necessitated return to older methods of preparation

Although the number of cases in which we have used propylthiouracil in the preparation of the patient with hyperthyroidism for operation is small, we are confident that it has made a valuable contribution to preoperative treatment Other measures of proved value introduced in recent years also have greatly contributed to reducing the mortality rate in all fields of surgery Agents for controlling infections, such as the sulfonamide compounds and the antibiotics are outstanding examples In a group of 801 patients with nontoxic goiter who underwent thyroidectomy without any special preoperative preparation, there were no deaths

RADIOIODINE

In recent years radioiodine has become an important tool in the study and treatment of thyroid disease It has proved particularly profitable in the experimental laboratory as a means of investigating many important aspects of thyroid physiology It has been used in in vitro experiments dealing with the synthesis of thyroid hormone, in numerous animal experiments dealing with the action of pituitary thyrotrophic hormone and with the site of action of various goitrogenic substances and in the study of numerous other problems involving the function of the thyroid

Radioiodine may, however, prove to have its greatest promise as a means for studying thyroid function in man Its use already has provided a considerable quantity of new information concerning the fundamental metabolism of iodine, the behavior of thyroid tumors and the action of antithyroid drugs It is safe to predict that the careful administration of radioiodine tracers to patients for purposes of clinical investigation will continue to augment our present knowledge of thyroid disease The value of radioiodine as a diagnostic agent is also becoming more and more apparent

The use of radioiodine as a therapeutic agent in carcinoma of the thyroid has been, with few exceptions, disappointing Grounds remain for hoping that means will be found which will make radioiodine more effective in this condition but at the present time only a small proportion of patients with malignant disease of the thyroid gland appear amenable to treatment with this agent.

Radioiodine has, on the other hand, proved to be an effective means of control in many cases of hyperthyroidism. Its use in this respect continues to be cautiously explored. At present, no serious ill-effects following the use of radioiodine have yet been reported, but concern over the possibility that untoward consequences of radiation might appear long after administration of radioiodine is an important factor that limits its more extensive use in hyperthyroidism.

Because of the unknown character of the radiation hazard in the treatment of hyperthyroidism with radioiodine, at the clinic we have deliberately limited the use of radioiodine to older patients for whom thyroidectomy is regarded as unduly hazardous because of some serious complication such as heart disease, and to cases in which repeated recurrences have followed previous thyroidectomies. The patients selected have, therefore, included a group in which the hyperthyroidism had proved itself resistant to other forms of treatment. Insufficient time has elapsed for accurate evaluation of the results of treatment of hyperthyroidism with radioiodine.

To date, however, the disease has been satisfactorily controlled by this means in more than 80 percent of the patients selected. The incidence of recurrences and of myxedema following use of radioiodine has, as might be expected, been found to be higher than is the incidence following thyroidectomy. In those patients in whom the disease has recurred, further doses of the isotope have controlled the disease. Much remains to be learned regarding the effective dose. Whether or not this can be gauged so accurately that recurrences or myxedema become less frequent, this substance will hold for some time an important place in the treatment of many patients in whom the risk of thyroidectomy would be excessively high even after preoperative preparation with propylthiouracil.

Patients with recurrent exophthalmic goiter in whom the thyroid remnant has not appreciably enlarged seem to us to be peculiarly suitable cases for treatment with radioiodine, as further surgical intervention will result in the removal of only minute amounts of thyroid tissue, and as these patients are particularly prone to recurrence of hyperthyroidism after treatment with antithyroid drugs. So, too, is the elderly patient with hyperthyroidism and serious heart disease a good candidate for radioiodine therapy, as no immediate risk has resulted in such cases, and late effects of radiation are not feared in such cases as they are in the young patient.

Radioiodine, either as a research tool or a

TABLE 1

Diagnosis	Cases	Hospital Deaths		
		Number	Percent	
Exophthalmic goiter	455	0	—	0.25
Adenomatous goiter with hyperthyroidism	334	2	0.6	
Adenomatous goiter without hyperthyroidism (including thyroiditis)	801	0	—	
Malignant disease	75	1	1.3	
Total	1,665	3	0.18	

Data on 1,665 consecutive cases of goiter (to January 1, 1948) in which thyroidectomy was performed.

therapeutic agent, is potentially dangerous and its use requires the same kind of precautions against the insidious and disastrous consequences of radiation for the patient the physician and the technician as does the use of radium or roentgen rays The application of radioiodine to clinical problems involves a large number of intricate and often highly technical problems, so that for a considerable time to come the safe use of this agent will be possible only when supervised by well integrated research teams which include physicists, radiologists, biochemists, internists and surgeons

SUMMARY

Propylthiouracil is a valuable drug for controlling hyperthyroidism, but because of its potential toxic side effects and because of the high incidence of relapses after its withdrawal, employment of this agent as the method of choice in the total treatment of Graves' disease has, in our opinion, not been established

As a means of preparing the patient for operation medication with iodine has proved adequate except for a small group of patients whose operative risk is high because of severity of hyperthyroidism or because of complications For this group, treatment with propylthiouracil has been found to be very valuable as an additional measure of preparation The surgical mortality rate for patients with toxic goiter prepared according to the above described method has been exceedingly low, namely, 0 25 percent

Treatment with radioiodine has proved to be an effective means of controlling the disease in many cases of hyperthyroidism The permanency of the results cannot now be determined Until greater accuracy in gauging the dose is established and until the potential radiation hazard in the treatment of hyperthyroidism with radioiodine is known, we believe that caution demands that employment of this drug be limited to those patients for whom thyroidectomy is regarded as unduly hazardous

We feel that thyroidectomy after either Lugol's solution alone or Lugol's solution and propylthiouracil preparation, is at the present time the most conservative method of treatment for the majority of patients with exophthalmic goiter The short time needed for this method of treatment, the speed of control of hyperthyroidism, the high incidence of permanence of control, and the low incidence of morbidity and mortality make surgical treatment a method which must still be considered in most cases of hyperthyroidism and which will be the treatment of choice in many instances

RIASSUNTO

Propiltiouracile e' una sostanza utile per il controllo dell'ipertiroidismo ma le possibili manifestazioni tossiche e l'alta percentuale di recidive dopo la sospensione della cura impediscono di adottarla quale metodo di elezione per la cura del morbo di Graves

Nella preparazione degli ammalati per l operazione l'iodio conserva nella maggioranza dei casi i suoi diritti Solo in un piccolo gruppo di casi, nei quali il rischio operatorio e' reso troppo grave dall'intensita' delle manifestazioni tossiche o da complicazioni il tiouracile offre degli effettivi vantaggi

La mortalita' operatoria nei casi di strumi tossici, preparati con questo metodo, e' scesa al *0,25%*

In molti casi di ipertiroidismo l'iodio radio attivo ha dimostrato un ottimo risultato sopra la malattia, ma sia perche' la durata dei risultati non e' stata ancora bene definita, sia perche' la determinazione della dose lascia ancora a desiderare, sia perche' i rischi della radio attivita' non sono ancora sufficientemente noti, l'A ritiene che questo rimedio vada riservato ai casi nei quali la tiroidectomia appaia troppo pericolosa La cura chirurgica, intrapresa dopo la somministrazione sia di iodio, sia di tiouracile, rimane nella maggioranza dei casi il metodo di elezione perche' richiede poco tempo, controlla rapidamente ma prolungatamente i sintomi di ipertiroidismo, presenta una bassa percentuale di morbilita' e di mortalita'

SUMARIO

En nuestra opinion la tiroidectomia con preparacion previa por la solucion de Lugol solamente o en conjuncion con la propiltiouracila es el metodo mas conservativo en el tratamiento de la tirotoxicosis en la mayoria

de los pacientes. Este tratamiento requiere poco tiempo, controla rapidamente las manifestaciones toxicas y da una alta incidencia de curaciones permanentes. Aun mas, presenta una mortalidad y morbilidad muy baja. Es por lo tanto el tratamiento de seleccion en la gran mayoria de los casos.

SOMMAIRE

Le propylthiouracile est un médicament de valeur pour le contrôle de l'hyperthyroïdisme, mais vu ses effets toxiques potentiels et aussi vu la haute fréquence des rechutes après la cessation de son administration, son emploi comme agent de choix dans le traitement exclusif du goître exophthalmique n'est pas definitivement établi. Comme moyen de préparer le malade pour l'opération, l'emlpoi de l'iode est adéquat, excepté pour le petit groupe de malades présentant des symptômes de risques opératoires élevés vu la sévérité de l'hyperthyroïdisme ou de ses complications. Pour ce groupe, le traitement avec le propylthiouracile a de la valeur comme mesure additionnelle de préparation. Les malades souffrant de goître toxique, préparés préopérativement par la méthode décrite cidessus, donnent un taux de mortalité très bas, à peu près de 0,25%.

Le traitement avec la radioiode s'est montré efficace pour contrôler beaucoup de cas D'hyperthyroïdisme. La permanence des résultats obtenue ne peut pas encore être déterminée. Tant qu'on ne sera pas définitivement renseigné sur la dose à employer et tant que les hasards potentiels de l'emploi de la radiation dans le traitement de l'hyperthyroïdismene sont pas connus. Nous croyons qu'il est mieux d'employer ce mode de traitement seulement pour les malades chez qui une thyroïdectomie nous paraît très dangereuse.

Nous sommes d'avis que la thyroïdectomie après l'emploi seul de la solution de Lugol ou avec la propylthiouracile est pour le moment la méthode la plus conservative pour la majorité des malades souffrant du goître exophthalmique. Le peu de temps requis pour ce mode de traitement, la rapidité avec laquelle l'hyperthyroïdisme est contrôlé, la haute fréquence de contrôle permanent et la basse incidence de morbidité et de mortalité, font que le traitement chirurgical est la methode doit être considérée dans la plupart des cas comme le traitement de choix.

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The Present Status of the Treatment of Hyperthyroidism

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UNTIL the discovery of the antithyroid effects of the derivatives of thiourea, subtotal thyroidectomy was the only means of controlling hyperthyroidism. Now *propylthiouracil, developed by Astwood, has* proved to be a relatively non-toxic drug and in adequate doses has been effective in controlling the hyperthyroidism of over 90 percent of the patients treated.[1] Although the hyperthyroidism often recurs promptly when treatment is withdrawn, some patients remain in remission indefinitely and appear to be cured.

The controversy between the proponents of propylthiouracil and those of thyroidectomy was at its height when radioactive iodine, first used in 1941 by Hertz[2] and independently by Hamilton and Soley,[3] became available in the form of I^{131}, and was distributed for experimental use by the atomic energy commission.

Propylthiouracil, thyroidectomy, and I^{131} each has its advantages and each seems well *adapted to the treatment of certain patients* with hyperthyroidism and less well adapted to the treatment of others. The purpose of this discussion is not to pass final judgment on the merits of the various forms of treatment now available but is rather to evaluate our present knowledge of their advantages and disadvantages.

THYROIDECTOMY

Thyroidectomy, after preparation with iodine, can be accomplished with a mortality rate of slightly less than 1 percent.[4,5] But if operation is deferred until the hyperthyroidism is completely controlled by the administration of propylthiouracil, and if the patient is further prepared by the administration of large doses of iodine for the last two weeks, the mortality rate of thyroidectomy falls to less than 0.2 percent.[5,6]

One of the factors in this reduction in mortality is the complete control of the hyperthyroidism prior to operation—a circumstance which reduces the risk to the level of that of thyroidectomy for simple goiter. A second factor is the ability of the surgeon to select the cases for operation and to treat by non-*surgical means those patients* who are not good risks.

Although thyroidectomy is an effective means of controlling hyperthyroidism associated with Graves' disease as well as that secondary to nodular goiters, the incidence both of recurrent hyperthyroidism and of postoperative hypothyroidism is much higher following operations for Graves' disease than following those for nodular goiter. If a very radical subtotal thyroidectomy is done for this disease, the incidence of postoperative hypothyroidism will be in the neighborhood of 20 percent and the incidence of recurrent hyperthyroidism over a five to 10 year period in the neighborhood of three percent. If a conventional type of thyroidectomy is done, the incidence of hypothyroidism will be only *about four percent. However, 15 percent of* the followed cases will develop recurrent hyperthyroidism within five to 10 years.[5] Following operations for nodular goiter with hyperthyroidism the incidence of recurrent hyperthyroidism is almost negligible. Regardless of technic, myxedema does not occur unless a true total thyroidectomy has been done, and even mild hypothyroidism is rare.[5]

In view of this experience it is clear that thyroidectomy is a preeminently satisfactory treatment for nodular goiter with hyperthyroidism and is a somewhat less satisfactory answer to the treatment of Graves' disease.

The morbidity following operation for Graves' disease and following operations for nodular goiter is approximately the same. If the conventional technic of resection of the thyroid over closed hemostats is used, my own experience indicates that it is not possible to perform an adequate thyroidectomy without causing permanent damage to one recurrent laryngeal nerve in about three percent of the cases and causing permanent tetany in at least 0.6 percent.[5] If the anatomic technic is used and the thyroid is rotated from its bed, the inferior thyroid artery ligated well lateral to the thyroid, and the recurrent nerve and parathyroids identified, the incidence of these complications is reduced to less than 0.4 and 0.2 percent respectively.[5,7]

From this summary it is apparent that in the hands of surgeons interested in thyroid disease, the mortality, morbidity, and end results of thyroidectomy for nodular goiter with hyperthyroidism are excellent and for Graves' disease are good, but somewhat less perfect.

Other factors associated with thyroidectomy that require consideration are:

1. The necessity for loss of work, hospitalization, and a relatively long period of detailed professional supervision.

2. The natural distaste of the patient for the discomfort and anxiety associated with an operation.

3. The minimum, but ever-present risk of incurring mortality or morbidity by operation.

4. The fundamental principle that if a more conservative treatment can give as good a result it is preferable to an operation from the standpoint of both patient and physician.

In favor of thyroidectomy are the following considerations:

1. The goiter is removed, a factor which may be of cosmetic importance and which may eliminate the remote possibility of a coexistent malignancy in a nodular goiter.

2. The results of treatment are prompt and definitive as compared with prolonged treatment with propylthiouracil.

PROLONGED TREATMENT WITH PROPYLTHIOURACIL

Propylthiouracil blocks the formation of thyroid hormone and in this way produces a physiologic instead of an anatomic thyroidectomy. It is not apparent why the hyperthyroidism does not always recur following a course of treatment with propylthiouracil because so far as is known, the underlying cause of the hyperthyroidism (i.e. the factor which drove the thyroid to hyperfunction) is not affected by the drug. Despite this fact longstanding and possibly permanent remissions of hyperthyroidism may be seen after a course of medical treatment. Complete control of the hyperthyroidism for a period of time, whether it be by thyroidectomy or by propylthiouracil, breaks the vicious circle of neuroendocrine disorders that are responsible for the maintenance of the hyperthyroid state.

Because it appears that complete control of the hyperthyroidism, for a period of several months or preferably from six months to a year, is a prerequisite for induction of a longstanding remission it is important to give a dose adequate to bring the basal metabolic rate to normal (0) or subnormal levels. Hyperthyroidism will recur promptly in those patients whose hyperthyroidism has been only partially controlled and also tends to recur promptly in those in which the period of control is unduly short.

McCullagh[1] has observed that 200 mg. of propylthiouracil will control the hyperthyroidism completely in 87 percent of the cases and 300 mg. will effect control in 96 percent. If hypothyroidism develops it is better to add small doses of thyroid than to reduce the dose of propylthiouracil to levels which may allow recurrence of hyperthyroidism. Small doses (10 mg. daily) of iodine given along with propylthiouracil do not significantly delay its action and may prevent the development of excessive vascularity. Propylthiouracil should be given in divided doses four times daily because the duration of the block induced by a single effective dose is short.[8]

The toxicity of propylthiouracil is low. No fatalities definitely attributable to its use have as yet been reported and agranulocytosis is rare. Side effects appear in about three percent of the cases and may be of sufficient severity to indicate discontinuation of treatment. Among the symptoms of toxicity are fever, skin rash, leukopenia, granulopenia, headache, and nausea. The incidence of agranulocytosis is so low that we have not believed it necessary to insist on weekly blood counts, but on merely checking the white blood count every two or three months when the basal metabolic rate is determined. We warn the patient to discontinue treatment and report at once for a blood count, if unusual symptoms should develop.

RESULTS OF TREATMENT

Experience in the treatment of over 300 patients by prolonged administration of propylthiouracil by Dr E P McCullagh at the Cleveland Clinic indicates that it is difficult to obtain longstanding remissions in the following groups of cases

1 Patients with severe hyperthyroidism (basal metabolic rate over +50) and large goiters (more than 2 or at most 3 times normal size) In these patients the hyperthyroidism tends to recur promptly as soon as medication is withdrawn or dosage decreased

2 Patients who do not respond well to treatment and in whom a low grade residual hyperthyroidism persists despite the administration of the usual dose

3 Patients with severe recurrent hyperthyroidism regardless of the size of the goiter

4 Patients whose thyroids enlarge under treatment In these cases not only does the hyperthyroidism tend to recur promptly when treatment is withdrawn but also the thyroid continues to enlarge so long as the drug is given

5 Patients of a low order of intelligence or those who will not cooperate are poor subjects for prolonged treatment as they tend to discontinue treatment or take the medicine irregularly

6 Hyperthyroidism associated with a nodular goiter may respond to treatment as well as Graves' disease, but patients with large nodular goiters often respond slowly and incompletely to ordinary doses Since nothing but thyroidectomy removes the goiter and eliminates the remote possibility of a coexisting carcinoma, thyroidectomy after preparation with propylthiouracil is a more satisfactory method of treatment than prolonged medical treatment unless the patient's life expectancy be short and his condition poor

The group of patients best suited for a trial of prolonged medical management in hopes of inducing a permanent remission, are those with small diffuse goiters and mild to moderate hyperthyroidism Providing that the patient is willing and able to cooperate, providing that there is no intolerance to the drug, no enlargement of the thyroid during treatment, and provided that the response to 300 mg of propylthiouracil daily is complete, there is about a 60 percent chance that the drug can be withdrawn after nine months of continuous treatment and that the remission will persist In 20 percent of the cases, the hyperthyroidism will recur promptly and in the last 20 percent it will recur within a few months

RADIOACTIVE IODINE

I^{131} is well adapted both physically and chemically to the treatment of hyperthyroidism Since its half life is only eight days nearly half of its radiation is expended in a week and most of it in a month No detectable traces of radiation remain in the thyroid two or three months after treatment

In hyperthyroidism I^{131} is concentrated in the thyroid exactly like the stable form of iodine, in concentrations up to 10,000 times as high as in any other tissue of the body Thus the thyroid receives intense irradiation while other organs receive almost negligible amounts following the average dose [9]

Since over 90 percent of the radiation of I^{131} is in the form of beta rays which penetrate the tissues for a distance of only one or two millimeters, there is no danger of serious injury to parathyroids, recurrent laryngeal nerve, trachea or other structures in the vicinity of the thyroid Moreover since the I^{131} is taken up selectively by the parts of the thyroid that are functioning most actively, these areas are selectively inactivated without interfering with the potential function of areas that are inactive

Since thyroid hormone contains iodine, and since in hyperthyroidism this hormone is fabricated in hyperfunctioning thyroid cells, it is theoretically possible to control the hyperthyroidism in 100 percent of the cases if sufficient I^{131} is given in divided treatments In Graves' disease, when the uptake of I^{131} tends to be uniform throughout the diffuse hyperplastic goiter, one small dose usually suffices to effect a cure In nodular goiter with hyperthyroidism, however, the uptake of I^{131} may be irregular and repeated doses may be required before the hyperthyroidism is controlled By this technic the most active areas are first inactivated and then as the next most active areas take over the function they in turn are inactivated by the second treatment and so on until a normal level of function is attained.

In a group of 28 patients all of whom have been followed longer than six months since the beginning of treatment, we have been able to control the hyperthyroidism in all cases.

In 19 patients with Graves' disease treated with I^{131} the average basal metabolic rate has fallen from +45 to 0. Control of the hyperthyroidism was effected by one treatment in over half of the cases and by two or three in the rest. The hyperthyroidism was well controlled in an average of three months after the first treatment. In most cases the thyroids are no longer palpable. Two patients have developed hypothyroidism.

In nine patients with nodular goiter with hyperthyroidism the average basal metabolic rate has fallen from +39 percent to +7 percent. The hyperthyroidism in all cases was well controlled in an average of five months after the first treatment. Two or three times as many treatments were required, however, and the total dose was three or four times as high. The average size of the thyroid has decreased from an estimated weight of 125 gms. to 70 gms. Hypothyroidism has not been observed.

The treatment of hyperthyroidism is to a large extent empiric whether it be by thyroidectomy, by propylthiouracil or by I^{131}. Surgeons have long known that a partial thyroidectomy for Graves' disease in which 5 gms. or more of thyroid is left often is followed by myxedema, whereas even the most radical subtotal thyroidectomy performed upon patients with normal thyroids or with nodular goiters causes no more than a transitory lowering of the basal metabolic rate. Similarly in Graves' disease a very radical thyroidectomy, in which only a few grams of thyroid tissue is left, may be followed by a recurrence of the hyperthyroidism. For these reasons we believe that attempts to estimate the exact amount of radiation that will be required to effect a desired result will often fail. Since the treatment of hyperthyroidism is essentially empiric it is safer to treat the patient by the method of Soley, giving repeated small doses until the desired effect is obtained.

In Graves' disease the required dose appears to be dependent more upon the severity of the hyperthyroidism than upon the size of the gland, although the latter must also be taken into account. Two or three mc. may control mild hyperthyroidism associated with small diffuse goiters whereas six to ten mg. may be required for very severe hyperthyroidism associated with large diffuse goiters. The average initial dose used in 80 percent of patients with Graves' disease is 4 mc. This dose may be repeated in two or three months if it proves inadequate or a smaller dose may be given if there is only slight residual hyperthyroidism. Since the full effects of the initial dose may not be apparent for four months, it is important not to treat the patient again too soon after the first dose if striking improvement has already been obtained.

In large multinodular goiters doses as high as 16 mc. may be given without danger of inducing hypothyroidism. The average dose is eight to 10 mc. repeated at two month intervals until the hyperthyroidism is controlled.

Occasionally a mild exacerbation of hyperthyroidism is observed in the first week or two following therapy, but aside from this no side effects or complications have been noted in 120 patients treated with I^{131}.

Although it is clear that I^{131} is a simple, effective and immediately safe method of treatment of hyperthyroidism, the ultimate results of such intense radiation are not yet known. The possibility of late carcinogenesis has been suggested, and for this reason I^{131} cannot be recommended for the treatment of younger patients without qualifications. Although there is as yet no clinical or experimental evidence that carcinoma of the thyroid can be induced by I^{131}, it is probably safer to limit its use to patients in the older age groups, or to those with recurrent hyperthyroidism or special problems of sufficient difficulty to justify the use of such intensive irradiation.

SUMMARY

At the present time there are three safe and effective means of treating hyperthyroidism: (1) thyroidectomy after preparation with propylthiouracil; (2) prolonged treatment with propylthiouracil, and (3) administration of radioactive iodine

Each of these methods is valuable in selected cases The treatment of hyperthyroidism should be individualized and each patient should be treated by that method which assures the best prospect for a safe and definitive cure

RIASSUNTO

L'ipertiroidismo puo' essere curato bene con tre diversi metodi

1) tiroidectomia, dopo un'adeguata preparazione con propiltiouracile
2) prolungata somministrazione di propiltiouracile
3) somministrazione di iodio radioattivo

La cura dell'ipertiroidismo va selezionata, nel senso che i pazienti dovrebbero essere affidati—in base alle condizioni individuali—a questo o a quel metodo di cura a seconda delle migliori prospettive di successo

SUMARIO

Al presente poseemos tres metodos de tratamiento del hipertiroidismo (1) la tiroidectomia previa preparacion por la propiltiouracil, (2) El tratamiento medico prolongado con la propiltiouracil, y (3) la administracion del yodo radioactivo Cada uno de estos metodos es de valor en casos seleccionados, por lo tanto el tratamiento dela tirotoxicosis debe de ser individualizado y el metodo de seleccion debe de ser el metodo que ofresca mayores ventajas para cada paciente

SOMMAIRE

Nous possedons trois methodes sûres et efficaces pour le traitement de l'hyperthyroidisme

1 Thyroidectomie après préparation préoperatoire avec la propylthiouracile
2 Traitement prolongé avec la propylthiouracile
3 Administration de iode radio activé

Dans les cas sélectionnés, chacune de ces méthodes a de la valeur le traitement de l'hyperthyroidisme doit être individualise et chaque malade doit être traité par la méthode qui est la plus apte de lui assurer une guerison sûre et définitive

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Malignancy of the Thyroid Gland*

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MALIGNANCY of the thyroid gland is largely a preventable disease. Over 90 percent of all neoplasms of the thyroid arise in pre-existing adenomatous goiters.

Unlike malignancy in so many other organs, it is possible to prevent its occurrence in the thyroid. Prophylaxis may begin even before the birth of the child. All pregnant women residing in endemic goiter regions should receive a 10 mg. dose of iodine once a week, unless some form of goiter is already present. Likewise, all children in these areas should be given a similar amount of iodine until they reach maturity. If such a program could be successfully carried out, colloid goiters would be largely eliminated. Since adenomatous goiters develop in neglected colloid goiters as a matter of compensatory hypertrophy, these nodular growths would in turn be prevented, and malignant thyroids would largely cease to occur.

This undoubtedly is more than we can hope to do in the way of prevention, and yet it is not a Utopian idea. In Wisconsin we have had a goiter prevention program in effect under the joint supervision of the State Board of Health and the State Medical Society for the past 15 years. A recent survey revealed that approximately one out of every two children of school age in the state, or 240,000 children, are receiving iodine tablets once a week during the school year. Surveys have also shown a decrease in the incidence of colloid goiters from as high as 80 percent down to 10 percent.

While admittedly this preventive campaign is conceived on a long time basis, unquestionably results are being obtained, and not only colloid but also adenomatous goiters are gradually being eliminated. As chairman of this committee for the prevention of goiter in Wisconsin during this 15 year period, it has been personally gratifying to see a successful campaign progress against this type of cancer.

Encouraged by our results in Wisconsin, I have recently appointed a committee of members of the American Goiter Assn. to study this problem on a national basis. Heading the committee are: Dr. Samuel Haines, thyroid authority, Mayo Clinic; and Dr. George Curtis, Ohio State University Medical School, whose studies on iodine in relation to the thyroid gland have been so valuable.

Cancer of the thyroid gland then is largely a preventable disease since the great majority of cases arise in pre-existing adenomatous goiters. There is nothing new or startling about this statement which has been accepted as a fact for many years. What is new is the fact that cancer of the thyroid is apparently increasing, that it is especially prone to occur in men having adenomatous goiters, and that not infrequently it may develop in children. These facts are new in the sense that we have come to recognize them in the past few years as a result of studies by various investigators.

As a consequence of these investigations and from a study of my own cases, I have now deviated from a 25 year policy and am advocating the removal of all adenomatous goiters in persons between the ages of 15 and 25. In the past I have advised parents whose child had an adenomatous goiter to leave it alone until the child was matured because of the possibility of a recurrence developing if surgery was performed before that time. Henceforth, I intend to advise operation when the child is 15 years of age or older despite this possibility because of the possible danger of cancer. Cancer in children with goiters is being reported by numerous writers.

Thyroid cancer in the male sex is no longer an uncommon disease and, like cancer of the lung, once we began to search for it we found it with increasing frequency. In my own series of 40 cases that I have just reviewed, there were 14 cases in the male sex.

The actual incidence of cancer of the thyroid in nodular goiter is a debatable question at the present time. Early writers on this subject from the time of Kocher, Wilson, Graham, Mayo, Crile, and Pemberton have reported an incidence approximating four percent In 1945 Cole stimulated great interest in this subject when he reported a startling figure of 17 per cent In a study of 192 nodular goiters, he reported that in 100 goiters of the multiple type cancer was present in 11 percent, and that in 92 of the solitary type it occurred in 24 per cent While these are considerably higher than those reported by other investigators Cole's report served the valuable purpose of stimulating interest in this subject

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* From the Frieda Meyers Nishan Foundation for the Study of Goiter of the Jackson Clinic, Madison, Wis.

It has been my impression that cancer of the thyroid is becoming more prevalent, and a review of my cases showed five out of every 100 nodular goiters observed in the past five years to be malignant Whether or not this is an actual increase, or whether it is due to the fact we are all becoming more cancer conscious and making a more careful search for malignant lesions, is a question

It is a fact that for many years there was little interest in this subject despite occasional excellent articles in the literature Certainly the problem was carefully considered by such authors as Kocher, De Quervain, Crotti, Joll, Dunhill, Eberts, Mayo, Crile, Graham, Lahey, Clute, Pemberton, Catell, Dinsmore, Heitzler, Means, Black, Tinker, Wilson, Klinck, and Davison, to mention only a few Yet a resumé of the *Transactions of the American Goiter Assn* showed few discussions upon this subject until the 1938 meeting when Pemberton reported a review of 774 cases seen at the Mayo Clinic

Pemberton illustrated that cancer of the thyroid was not as hopeless a disease as it had been generally considered and that even cases that were recognizable clinically might be kept alive for many years In particular, he stressed the point that in 60 percent of the cases operated upon, a diagnosis had not been made prior to surgery That was likewise true in my own study, 18 of the 40 cases being unsuspected prior to thyroidectomy This emphasizes the importance of removing all adenomatous goiters, since there are no clinical symptoms whereby the disease may be recognized in its early stages

When a patient comes in stating that there has been a recent rapid growth of a long standing goiter, that there is hoarseness, shortness of breath, and a sense of constriction it is probable that a neoplasm has developed and surgery is hopeless I can see no reason why any physician should advise a patient not to have a nodular goiter removed When one stops to consider that one out of every two of these tumors may in time become toxic, that 20 percent become substernal or intrathoracic and seriously interfere with respiration and embarrass the heart, and that one out of five may become malignant, there can appear no logical reason why they should not be removed when first recognized

If tumors of equivalent size are diagnosed in other organs of the body, little time is lost in seeing that they are removed Because goiters are commonplace, they are treated with too little concern by the laity and profession alike In the hands of a competent thyroid surgeon the risk of either complications or mortality in a thyroidectomy performed for a nontoxic nodular goiter is negligible

While it is true that approximately 90 percent of malignant goiters arise in pre existing nodular growths, there are few rare lesions that do not arise as such Pemberton and Black have shown that cancer of the thyroid does arise in the presence of exophthalmic goiter in which no demonstrable microscopic evidence of adenomatous tissue has been observed The question of sarcoma of the thyroid is one concerning which there has been disagreement, some authorities even disputing the existence of this lesion In my series three apparent cases of typical sarcomata were seen

A review of the literature regarding the pathologic classification of malignancy of the thyroid only serves to confuse the reader It is not a matter of major importance so long as one recognizes the degree of malignancy and the chance of cure or at least of arresting the disease Certain of the papillary adenocarcinomata are of a low grade type and, if thoroughly eradicated and followed with proper x ray therapy, offer hope of possible cure These growths are apt to occur in young people and comprise at least a third of all cancer of the thyroid In this group are the so called lateral aberrant thyroid tumors which at one time were believed to be malignant growths arising in congenital bits of thyroid tissue located in the cervical gland region of the neck. Through the studies of Eberts, Clay, Wathuell, Pemberton, Black and others, we know now that these are actually metastatic lesions from the thyroid gland. If they are removed and if a total lobectomy is performed on the adjacent lobe and a subtotal lobectomy on the other lobe, there is a good chance of long survival.

Likewise, in many of the small adenocarcinomata, not observed by the surgeon but first detected by the pathologist, there is hope of cure. On the other hand, the diffuse adenocarcinoma is usually of short duration, grows rapidly, is highly malignant, and is seldom amenable to either surgery or roentgenotherapy.

Finally we come down to our newest form of therapy, radioactive iodine. For a time this seemed to offer great hope in treating those patients who could not be handled by other means at our disposal. To date, however, the results have proved unsatisfactory, and it seems probable that no case has yet been cured by this method. Unfortunately, only certain areas of the cancer are affected by radioactive iodine, so that at present this form of therapy is of little value. It is possible that further research along this line will lead to the development of a more successful agent.

In conclusion, I would like to emphasize that the thyroid gland offers a better opportunity for the prevention of cancer than any other organ of the body. Prevent the development of colloid goiter, and, in turn, eliminate most adenomatous goiters. Remove all adenomatous goiters when they are recognized between the ages of 15 and 25, and prevent the development of nine out of every 10 malignancies of the thyroid.

SUMMARY

Malignancy of the thyroid gland is largely a preventable disease. All children and all pregnant women residing in the endemic goiter areas should receive 10 mg. of iodine weekly. Prevention of colloid goiters will largely eliminate adenomatous goiters. Since nine out of every 10 neoplasms of the thyroid arise in pre-existing adenomata, eradication of the latter will largely eliminate cancer of the thyroid

Adenomatous goiters should be removed on recognition, unless there is some special contraindication, and preferably in persons between the ages of 15 and 25. Conclusions based upon a study of 40 cases of cancer of the thyroid are presented. The high incidence of carcinoma of the thyroid in men and the high incidence in the solitary type of nodular goiter are emphasized.

RIASSUNTO

I tumori maligni della tiroide possono essere spesso prevenuti. Tutti i bambini e tutte le donne gravide appartenenti a zone nelle quali il gozzo e' endemico dovrebbero ricevere 10 mg. di iodio al giorno. Questa e' la prima fase di prevenzione, poiche' la prevenzione dei gozzi colloidi elimina a sua volta i gozzi adenomatosi. E poiche' sopra 10 tumori della tiroide, 9 originano da preesistenti adenomi, l'eliminazione di questi rappresenta la migliore cura profilattica dei cancri. Appena riconosciuti, i gozzi adenomatosi dovrebbero essere—a meno che non esistano speciali controindicazioni—asportati: cio' specialmente negli individui fra 15 e 25 anni.

L'A. richiama infine l'attenzione sopra l'alta incidenza di cancri della tiroide negli uomini e piu' specialmente nel tipo solitario dei gozzi nodulari.

SUMARIO

Las degeneraciones malignas de la glandula tiroidea son en general prevenibles. Toda criatura y toda mujer embarazada que habitan en regiones goitreogenicas endemicas deben de recibir 10 mgms de iodo por semana. La prevencion de los estrumas coloidales generalmente eliminan los estrumas adenomatosos. de cada dies caso de cancer del tiroides nueve ocurren en adenomas pre-existentes; por lo tanto, estos casos se pueden eliminar evitando los adenomas. Los adenomas del tiroides deben de resectarse tan pronto son diagnosticados especialmente en pacientes en las etapas de la vida de 15 a los 25 anos a no ser que existan contraindicaciones especiales. Se presentan las conclusiones del autor basadas en una serie de 40 casos de cancer del tiroides y la incidencia alta del cancer en el hombre asi como del tipo solitario nodular.

SOMMAIRE

Les tumeurs malignes de la glande thyroide peuvent en grande partie être eviteés Tous les enfants et toutes les femmes enceintes demeurant dans une *région* où le *goître est* endémique doivent recevoir 10 mg d'iode chaque semaine, le prévention du goître Colloide éliminera 9 des 10 neóplasmes de la glande thyroide se developpant an adénome en grande partie les goîtres adénomateux Vu que 9 sur 10 neóplasmes ont leur origine dans des adénomes préexistants, une éradication de ces derniers éliminera en grande partie le cancer de la thyroide Le goître adénomateux devra être enlevé aussitôt que diagnostiqué chez les personnes de 15 a 25 ans à moins de contre indication speciale Ces conclusions sont basées sur une étude de quarante cas de cancers de la glande thyroide

L'auteur attire l'attention sur la fréquence du carcinome de la glande thyroide chez l'homme et aussi sur la haute fréquence du goître nodulaire solitaire

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Thyrotoxicosis Without Elevated Basal Metabolism*

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MANY believe that thyrotoxicosis and hyperthyroidism are synonymous terms and that clinical manifestations of a toxic goiter result from an excess of the thyroid hormone. Excess thyroxine produces elevated metabolism, weight loss, increased heart rate, often exophthalmos and other symptoms that typify toxic goiter. Many patients with goiter symptoms, however, do not fit into this category.

TABLE 1

Thyrotoxicosis without Elevated Metabolic Rate —100 Cases

Age	Duration Goiter	Duration Symptoms	Weight loss	Pulse rate	B.M.R.
43.3	8.7[1] yrs.	2.3[2] yrs.	11.6[3] lbs.	102	+10

1—Nodular 10.6 years; diffuse 4.5 years.

2—Nodular 3.5 years; diffuse 2.7 years.

3—Nodular 63% lost weight; diffuse 97% lost weight.

Patients with the type of thyrotoxicosis described in the previous paragraph show a definite pathological picture when the goiter is examined microscopically. The cells lining the acini show definite growth activity. Instead of the low cuboidal cells of the normal gland, they are columnar and proliferative, often piling up and producing buds that encroach on the colloid and tending to fill the acini.

There is another clinical picture often occurring in patients with long standing goiter in which the symptoms are predominantly cardiac. These patients may lack many of the symptoms of active thyrotoxicosis. They often have auricular fibrillation and all stages of congestive heart failure, from just edema of the lower extremities and moist rales in the bases of their lungs to free fluid in the chest cavities. They may have extreme dyspnea on exertion often with some cyanosis. They may

TABLE 2

Duration of Goiter
Nodular (70)
Average duration 10.6 years

duration—years											
20 and over		2	31%	3	20%	3	22%	3	50%	11	27%
15 to 20		1								1	
10 to 15	1	2		2		1		1		7	
5 to 10		3	44%	6	48%	2	17%	2		13	19%
2 to 5		4		6		1				11	31%
2	1	3	23%			5	61%	2		11	
1 or less	1	1		8	32%	6				16	23%
Totals	3	16		25		18		8		70	
Age group	20 to 29	30 to 39		40 to 49		50 to 59		60 to 72		All ages	

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*From the Hertzler Clinic, Halstead, Kans.

have a normal slightly elevated or even a subnormal basal metabolic rate The nervous symptoms are often absent The notable feature is the patient's facial expression, usually one of apathy and weariness The outstanding pathological feature in the microscopic section of the glands of these patients is the presence of varying degrees of degeneration and the absence of hyperplasia There may be nodules degenerated to the extent of being cystic and there is often present areas of replacement fibrosis In areas where degeneration has not taken place, the acini are often large and lined with a single layer of almost squamous cells *which certainly could not be interpreted as* being active

In the study of these glands many sections were taken from areas which grossly did not show degeneration and in none was cellular hyperplasia noted T C Davison, Atlanta Ga, long ago called attention to this type of goiter and called it "chronic hyperthyroidism with low basal metabolic rate" In the present state of our knowledge it would seem that we should regard this type of thyrotoxicosis as one resulting from an altered thyroid secretion rather than from an excess of the normal secretion

The material presented in this paper represents a study of 100 selected goiter patients A total of 700 were admitted for thyroid surgery during the two year period, 242 of the 700 had clinical evidence of toxic goiter with basal metabolic rates within normal limits Four criteria were required to place a patient in the group of goiter patients

The four points listed under "criteria" were chosen arbitrarily to eliminate equivocal subjects The first requirement eliminated 56 patients In addition 37 patients qualified under the first three requirements but were eliminated because the admission pulse rate was under 88 per minute Another 49 patients *were eliminated because of original typing* This leaves 100 patients who fulfilled all of the following requirements

Thyrotoxicosis without elevated metabolic rate criteria

1 No iodine therapy during preceding six months
2 Clinical evidence and symptoms of toxic goiter
3 Basal metabolic rate plus 24 or less
4 Resting pulse rate 88 per minute or over

Table 1 shows composite average on the group of 100 patients It includes 70 cases of nodular goiter and 30 with diffuse goiter Thus the average patient is 43 3 years old, has

TABLE 3

Duration of Goiter

Diffuse (30)

Average duration 4 5 years

duration—years	20 and over		1		1	1	3	23%
	15 to 20	1					1	
	10 to 15		1		1		2	
	5 to 10		1				1	
	2 to 5	1					1	
	2	2		3			5	72%
	1 or less	6	5	5	1		17	
Totals		10	8	8	3	1	30	
Age group		20 to 29	30 to 39	40 to 49	50 to 59	60 to 72	All ages	

Thyrotoxicosis Without F

V. E. CHESKY, M.D., F.A.C
HALSTI

MANY believe that thyrotoxicosis an hyperthyroidism are synonymo terms and that clinical manifestatio of a toxic goiter result from an excess of t thyroid hormone. Excess thyroxine produ elevated metabolism, weight loss, increa heart rate, often exophthalmos and o symptoms that typify toxic goiter. Many

TABLE 1

Thyrotoxicosis without Elevated Metabolic
—100 Cases

Age	Duration Goiter	Duration Symptoms	Weight loss	Pulse rate
43.3	8.7[1] yrs.	2.3[2] yrs.	11.6[3] lbs.	102

1—Nodular 10.6 years; diffuse 4.5 yea
2—Nodular 3.5 years; diffuse 2.7 yea
3—Nodular 63% lost weight; diffu weight.

duration - years	20 and over	
	15 to 20	
	10 to 15	1
	5 to 10	
	2 to 5	
	2	
	1 or less	
Totals		
Age group		

From the Hertzler Clin

cidence is highest in the 40 year old group with numbers approximately equal in the preceding and following decade One patient in the twenties had known of the goiter since 10 years old For the group 27 percent had had goiters for 10 or more years (11 percent for 20 years or over)

Diffuse goiter is more acute than nodular, probably on a quantitative rather than qualitative basis (Table 3) It is to be noted that it is by no means necessarily a disorder of young patients though one-third of the series were under 30 years of age More than one half of the patients between 20 and 50 had noticed their goiters for a year or less Twenty three percent of the series had had goiters for five years or over

An average duration of symptoms for three and one half years gives no idea of the variation in a group of 70 nodular goiters (Table 4) Here one sees the wide distribution of duration versus age with a fairly even spread throughout the table

The distribution of symptom duration versus age is *less evenly spread in diffuse* goiter (Table 5) Here it is to be noted that patients under 50 years of age have had their symptoms for a relatively shorter period than the older age groups Half of the entire group had had symptoms for two or more years

The average pulse rate of 102 results from combining a rate of 88 to 96 in 43 patients *with much higher rates in the remaining sub*jects (Table 6) In 57 patients the pulse rate was 100 or over Twenty six percent of the series had a pulse rate of 112 or over while five percent give counts of 120 or over The fairly even distribution over the table indicates no significant correlation between age and pulse rate

Comparison of B M R and age reveals no significant correlation (Table 7) Seventy eight percent of the group had B M R s entirely within normal limits the remaining 22 percent cannot be considered as having significantly elevated B M R For this reason no attempt was made to correlate the B M R with duration of the goiter or with the heart rate

Chemical analysis of thyroglobulin from toxic goiters after iodine therapy reveals alterations in the distribution of organic iodine Chemical changes in goiter are

1 Colloid goiters differ from normal colloid in a Decrease in total iodine, b Decrease in thyroxine iodine, c Increase in organic iodine in form other than thyroxine

2 Most clinically toxic diffuse hyperplastic *goiters have lowest thyroxine content*

3 Lowest thyroxine values found in goiters of long duration in old cardiotoxic goiter

As shown in the graph (Chart I) normal thyroglobulin contains four tenths percent total iodine Ninety three percent of this is present in organic form (iodoprotein) Roughly one half of this organic iodine exists in the *form of thyroxine*

TABLE 6

Pulse Rate

Nodular and Diffuse

Average 102 per minute

rate per minute	Over 120		2	1	2		5	
	112 to 120	3	4	8	5	1	21	57%
	100 to 108	3	10	6	10	2	31	
	88 to 96	7	9	14	7	6	43	
Totals		13	25	29	24	9	100	
Age group		20 to 29	30 to 39	40 to 49	50 to 59	60 to 72	All ages	

TABLE 7

Basal Metabolic Rate
Nodular and Diffuse
Average +10

B.M.R.	+20 to +24		5	6	3	8	22
	+10 to +19	5	6	8	11	1	31
	+1 to +9	8	7	10	5	1	31 78%
	−5 to 0	1	5	4	5	1	16
Totals		14	23	28	24	11	100
Age groups		20 to 29	30 to 39	40 to 49	50 to 59	60 to 72	All ages

Thyroglobulin from goiters removed surgically show: 1. Decrease in total iodine; 2. Decrease in thyroxine iodine; and 3. Increase in the nonthyroxine organic iodine fraction. All of the patients had received Lugol's solution before operation. This indicates that the goiterous gland is deficient in two respects: it is incapable of storing normal amounts of iodine; and it cannot convert organic iodine into thyroxine and store it in normal amounts.

TABLE 8

Effect of Goiter Extract 21874 on Metabolism and Heart Rate of Thyroidectomized Rats

Rat No.	Mg. Oxygen per kilo per hour			Heart Rate		
	Before	After	% Change	Before	After	% Change
1.	1350	980	−27	160	300	+88
2.	1230	1095	−11	180	300	+67
3.	1500	1600	+7	156	300	+92
4.	1108	1000	−10	150	277	+85
5.	1082	1090	0	144	276	+92
6.	960	1030	+7	180	300	+67
7.	1050	1000	−5	160	300	+88
8.	1008	1095	+9	220	330	+50
9	1100	1110	+1	176	360	+84
10	880	1080	+23	240	360	+50

Extracts from goiters contain a principle which stimulates the heart rate of thyroidectomized rats without a corresponding increase in rate of oxygen consumption (Chart II).

Total removal of the thyroid from 60-day old rats resulted in retarded growth. At the end of one month there is a decrease in oxygen consumption of 40 percent and a decrease in heart rate from a normal of 300 beats per minute to about 150 beats.

Thyroxine feeding produces comparable rise in both oxygen consumption and heart rate. Twenty micrograms of thyroxine iodine for three days brings both to approximately normal at the end of five days.

Extract from goiters fed in a dosage that causes no appreciable rise in oxygen consumption (five micrograms thyroxine-iodine daily for three days) stimulated the heart rate to normal or above. These extracts contained greatly reduced concentrations or thryroxine-iodine with greatly increased amounts of organic iodine other than thyroxine. Thus the lower the thyroxine-iodine—the greater the quantity of extract fed. These experiments indicate that the nonthyroxine fraction of thyroglobulin contains a principle capable of stimulating the heart without a corresponding effect on metabolism.*

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*Endocrinology, 31: 684-688, No. 6, Dec. 1942.

CHART I DISTRIBUTION OF ORGANIC IODINE IN GOITER

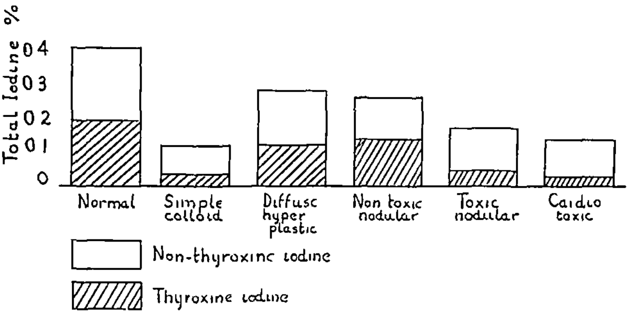
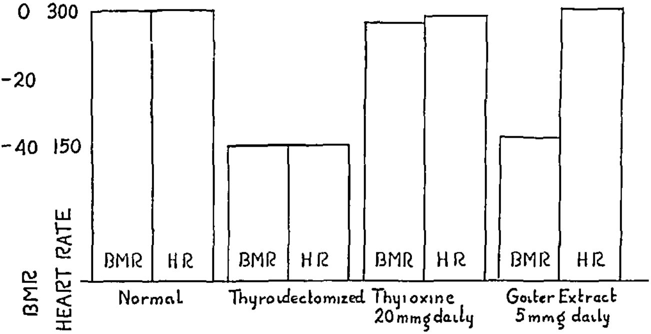


CHART II CARDIAC STIMULATING PRINCIPLE FROM TOXIC GOITER EXTRACT (NOT THYROPINE)



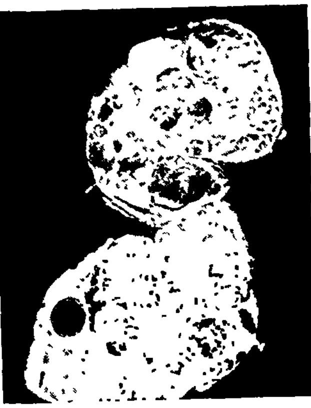
CASE REPORT

Female, white age 67, had had a goiter for 25 years She also complained of tachycardia palpitation and nervousness for one year Her weight loss was 20 lbs in one year Hippuric acid was made, on admission 58 percent, preoperative, 84 percent The B M R was plus eight pulse and apex rate, 96, weight of the goiter, 194 gm (Goiter extract 21874)

Chemical Assay The total organic iodine was 0 12 percent (normal, 0 03 to 0 5 percent), thyroxine iodine was eight percent (normal, 43 percent) The biological assay was made on young rats totally thyroidectomized at two months of age Assays were made two months later, after oxygen consumption was stabilized at subnormal Extract was administered daily by stomach tube for three days Oxygen consumption and heart rate determinations were made before feeding, and again on the fifth day

Dosage of Extract Fed Over a three day period the dosage of extract given was 15 mcg of thyroxine iodine per 100 gm of rat The total organic iodine intake was 180 mcg (165 mcg of nontoxic organic iodine)

Table 8 shows the effects of feeding experiments of this patient's goiter extract Ten animals were used to minimize individual



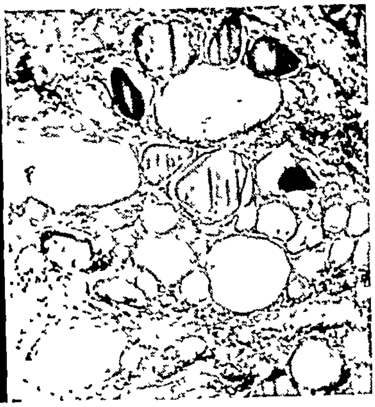


Fig. 1 (Case 1). Photograph of patient from whom goiter extract 21874 was made.
Fig. 2. Cross section of goiter from patient, showing degeneration and no hyperplasia.
Fig. 3. Photomicrograph of goiter in Figure 2, showing degeneration and no hyperplasia.

variations. On the left is the effect on goiter consumption, the average of which is relatively unchanged. On the right it is seen that increased heart rate resulted in every instance. All heart rates were determined by electrocardiographic tracings with the animals under light nembutal narcosis. We consider this as evidence that extracts from certain toxic goiters of long standing contain a principle which stimulates the heart rate of thyroidectomized rats without an associated increase in the rate of oxygen consumption.

SUMMARY

The concept that clinical manifestations of toxic goiter are due to an excessive production or liberation of thyroxine fails to explain thyrotoxicosis with little or no elevation of metabolic rate. It is felt that the term "hyperthyroidism" should be restricted to diffuse hyperplastic goiter in which elevated metabolism is an outstanding feature. The general clinical picture of thyrotoxicosis is best explained on the basis of perverted thyroid secretion instead of on the basis of excessive normal secretion.

RIASSUNTO

Il concetto che le manifestazioni cliniche del gozzo tossico siano dovute ad un'eccessiva produzione o liberazione di tiroxina non puo' spiegare i casi di tireotossicosi senza elevazione del ricambio basale. L'A. ritiene che il termine di ipertiroidismo vada riservato ai gozzi diffusamente iperplastici, nei quali l'aumento del ricambio basale sia l'esponente clinico predominante. Il quadro clinico della tireotossicosi e' spiegato meglio dal concetto di una pervertita, che non di un'eccessiva secrezione tiroidea.

SUMARIO

Segun el autor el concepto de hipersecrecion de la tiroxina en la produccion de las manifestaciones clinicas de la tirotoxicosis no explica esta condicion en aquellos casos que presentan un metabolismo normal o muy poco elevado. Por la tanto el termino "hipertiroidismo" se debe de restringir a los casos de hiperplasia difusa de la glandula con metabolismo elevado. En cambio el panorama clinico de la tirotoxicosis en general se explica mejor a base del distiroidismo o es decir de la perversion de la secrecion glandular.

SOMMAIRE

Les conceptions que la manifestation de goître toxique est dûe à une production excessive ou libération de thyroxine, n'expliquent pas pourquoi dans certains cas de thyrotoxicose, il y a pas ou presque pas d'élévation du métabolisme basal. L'auteur pense qu'on devrait restreindre le terme "hyperthyroïdisme." On devrait restreindre un terme au goître hyperplastique diffus dans lequel l'élévation du métabolisme est très évidente. Les symptómes de la thyrotoxicose sont mieux expliqués sur la base d'une secrétion thyroïdique pervertie que sur la base d'une secrétion excessive.

The Relation of Metabolism to Thyroid Surgery

MERRILL N. FOOTE, M.D., F.A.C.S.
BROOKLYN, N. Y.

EVEN today too many patients are being subjected to needless thyroid surgery because of an elevated metabolic reading. *It is therefore timely to briefly evaluate this* problem. The basal metabolic rate measures the calories per square meter per hour.

The surgeon, upon whose judgment rests the final decision as to whether or not an operation should be done for hyperthyroidism, should be a little familiar with some of the fundamental facts concerning the normal basal metabolic phenomena as well as its variabilities. "The Variability of Basal Metabolism," by Boothby, Berkson and Plummer, appeared in *Tr. of The Am. Assn. for the Study of Goiter*, 1937, and will be referred to at some length.

The normal or gaussian curve is "a symmetrical curve, in shape, and is completely defined mathematically for any given group by *two constants, namely, the mean and the* standard deviation. It is calculated as usual by adding all the observations, and by dividing the sum by the number of observations."

Boothby and co-authors during the period of 1917 to 1926 studied 7117 patients at the Mayo Clinic having non metabolic diseases and produced thereby the so-called "Mayo Foundation Normal Standards."

The results of the studies are represented in the figures 2, 3 and 4 and are self-explanatory. In conclusion Boothby states: "finally it must be recognized that basal metabolism as an actual observation, under any defined stand*ard condition, is variable, like any biologic* observation, and in consequence no one *lowest* metabolism has a prerogative to be considered *the* basal metabolism over any other measurements made under the defined conditions."

Every surgeon who does a large amount of thyroid work has a goodly number of cases constantly being sent to him for operation because of an increased basal metabolic rate. *Upon careful evaluation however, many are* not found to be suffering from hyperthyroidism, but from one of many other diseases or *conditions in which an elevated basal metabolic rate is also found.*

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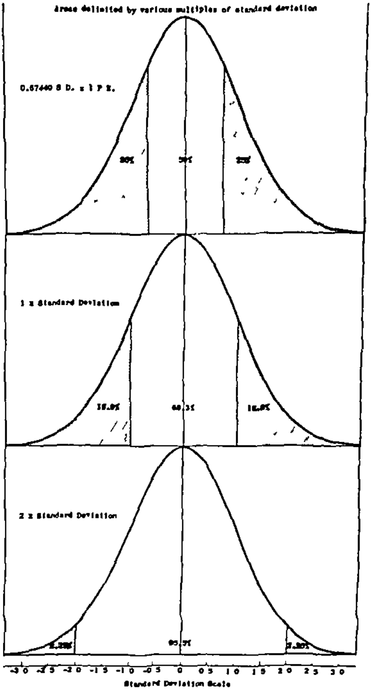
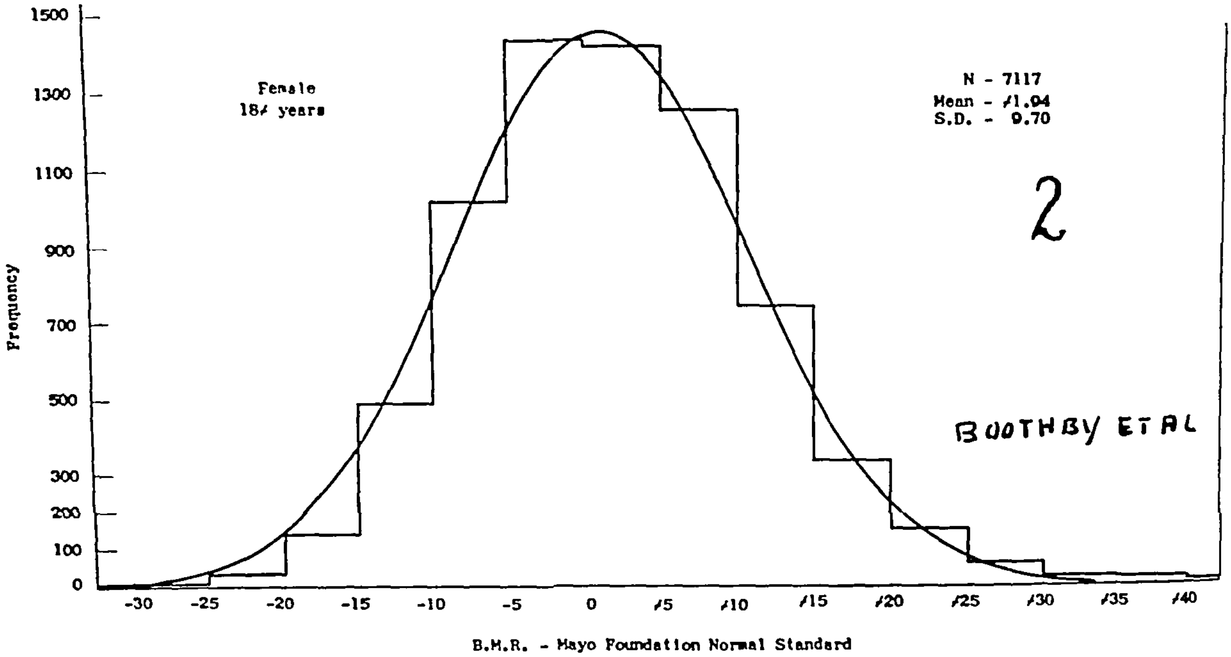


Normal or gaussian curve.
BOOTHBY ET AL



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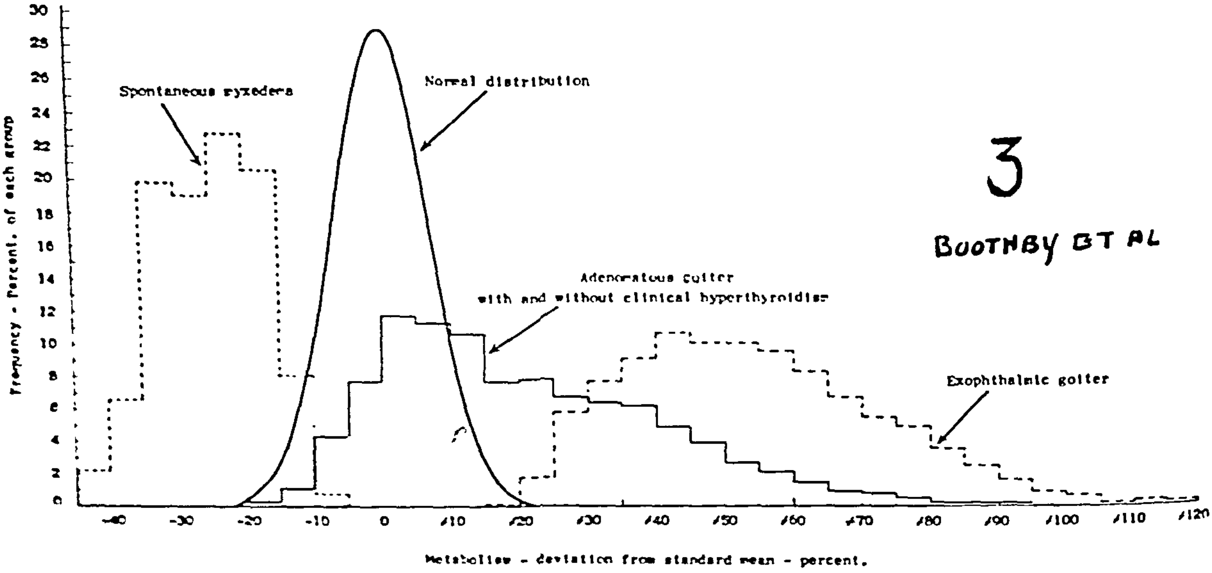
BOOTHBY ET AL

For many years hyperthyroidism was overlooked by the family physician and many patients were treated for some other non-existing disease. With the advent of the basal metabolic machine, which is now a part of the equipment in most doctors' offices, and with the literature replete with rules of thumb by which a diagnosis of hyperthyroidism can be easily made, and because of the satisfactory results of surgery properly done on properly selected cases, it is not difficult to understand the frequent errors that are therefore made, in diagnosing this condition.

It is true that most cases of hyperthyroidism are associated with elevated basal metabolic readings. Many elevated basal metabolic ratings, however, are not indicative of hyperthyroidism. There are several reasons for this. In the first place, numerous psychical, physiological and pathological processes, other than



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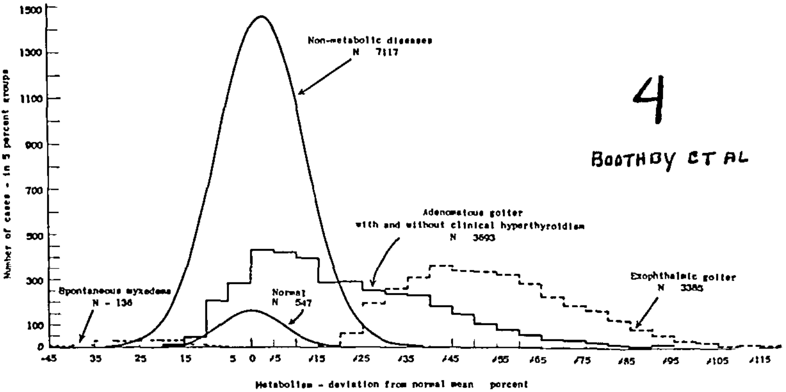

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BOOTHBY ET AL

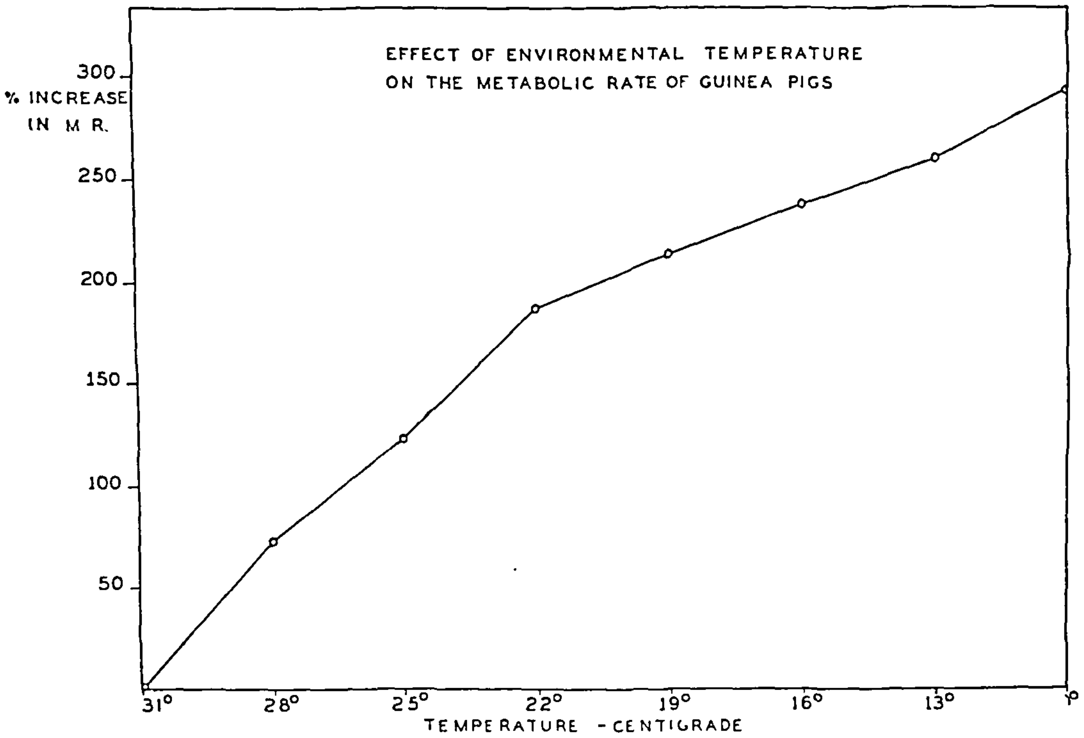
toxic goiter, are accompanied by an increased basal metabolic rate Any condition which causes rapid respiration such as emotional states, or exercise, the menstrual cycle, diseases, such as cardiac disorders, tuberculosis, diabetes various heart conditions, some malignancies, especially lymphosarcoma or any disease accompanied by a fever will result in an increased basal metabolic rate Other rather common diseases producing an increased metabolism are leukemia, anemia, and disorders of the pituitary and adrenal glands Riddle has shown that the metabolism rate in pigeons which have received thyroid or thyrotropic hormone was increased when the basal metabolic reading was done at the critical temperature, but that it was decreased when the measurements were made at 15° centigrade Collip and Billingsley confirmed these findings while experimenting with rats and guinea pigs

The basal metabolic rates in children are notoriously unreliable In the first place it is difficult to obtain a true reading in children, and when the reading is obtained it is very apt to be abnormally increased, without any evidence of hyperthyroidism being present On the other hand, a persistently low basal metabolic reading is rarely present in cases of hyperthyroidism It is necessary to base one's judgment largely upon clinical experience in dealing with hyperthyroidism in the younger age group

In addition there are many mechanical and technical errors which may play a role in producing an increased consumption of oxygen, such as the inaccurate adjustment of the breathing tube in the patient's mouth, or the improper application of the clip on the nose faulty flutter valves, leaking tubes, or an alteration of the chemical substances used in some of the metabolism machines After all the metabolism apparatus only records the amount of oxygen consumed by the patient per minute This may in no way be related to hyperthyroidism As stated above, *the basal metabolic rate measures the calories per square meter per hour*

Means has properly said that basal metabolic readings are "never too low unless the patient goes to sleep, or unless there is a technical error on an inward leak in the apparatus being used All other errors which tend to make the test inaccurate (making it too high) are recent exercise, eating, emotional states, fever and etc It is apparent then that a single low reading is more apt to be accurate than a single high reading"

Krogh has called attention to the fact that "adventitious departures from the usual basal conditions more frequently raise than lower the measured metabolism" It might, there-



Showing the effect of lowering the environmental temperature upon the metabolic rate of the guinea pig. Points on the curve represent an average of three determinations on a group of eleven pigs.

fore, have been better to use the term "standard metabolism" than basal metabolism.

Boothby has shown that in a group of normal individuals, "adult males are more variable in their metabolic readings than females. Repeated determinations for individual females are, however, more variable than for males. Therefore, when single determinations for many individuals are used to measure the variability, the total gives a larger net variability for females."

It seems fair to assume that the basal metabolic reading is only another laboratory test which should always be carefully considered but not necessarily considered too seriously. Basal metabolism readings will never replace the clinical judgment of the physician in charge or the surgeon to whom the patient is referred.

Repeated tests on the same individual either before or after operation, if done under as nearly similar conditions as is possible, are of great value in determining whether the metabolism is rising or falling. This test is helpful in following an individual case for a relatively long period of time. It is far more valuable in a situation of this sort than a single reading in making the diagnosis of hyperthyroidism.

Generally speaking the basal metabolic rate is more apt to reflect accurately the degree of toxicity in toxic diffuse goiters than it is in toxic nodular goiters. This is to be expected because the onset of toxic nodular goiter is far more insidious, and the clinical symptoms are definitely less severe than they are in toxic diffuse goiters.

Dr. T. C. Davison has called attention to a group of cases in which the signs of hyperthyroidism have been present over a long period of time. The patients are moderately toxic and manifest all of the clinical signs and symptoms of hyperthyroidism but the basal metabolic readings are consistently low. He has termed this entity "chronic hyperthyroidism." We have all been aware of this condition, and also of the fact that these patients even though they do have signs of toxic goiter with a low metabolic reading, are relieved of their clinical symptoms after proper resection of the thyroid gland It is interesting to note that operation does not decrease the basal metabolic rate in the same ratio as the signs of hyperthyroidism are decreased

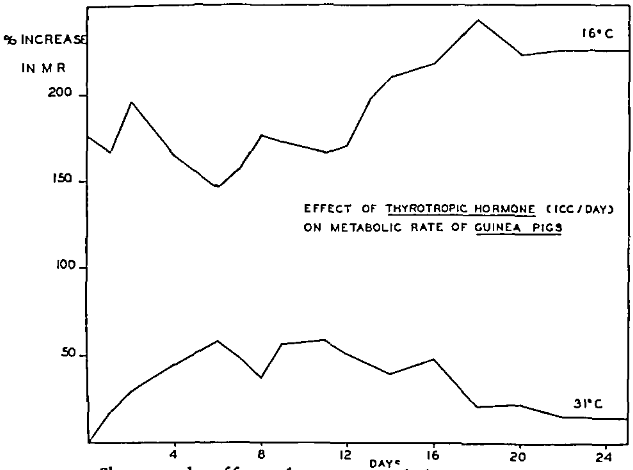
For years we have taught our residents that we are less impressed by a single metabolic reading in diagnosing toxic goiter whether it be of the diffuse type or of the nodular type, than we are by the results of a careful history and a proper physical examination

It should always be stressed that there is never any hurry about making a decision as far as surgery is concerned in any patient having a questionable toxic goiter If the symptoms are so bizarre that they are difficult to interpret in terms of toxic goiter, prolonged study and observation are indicated

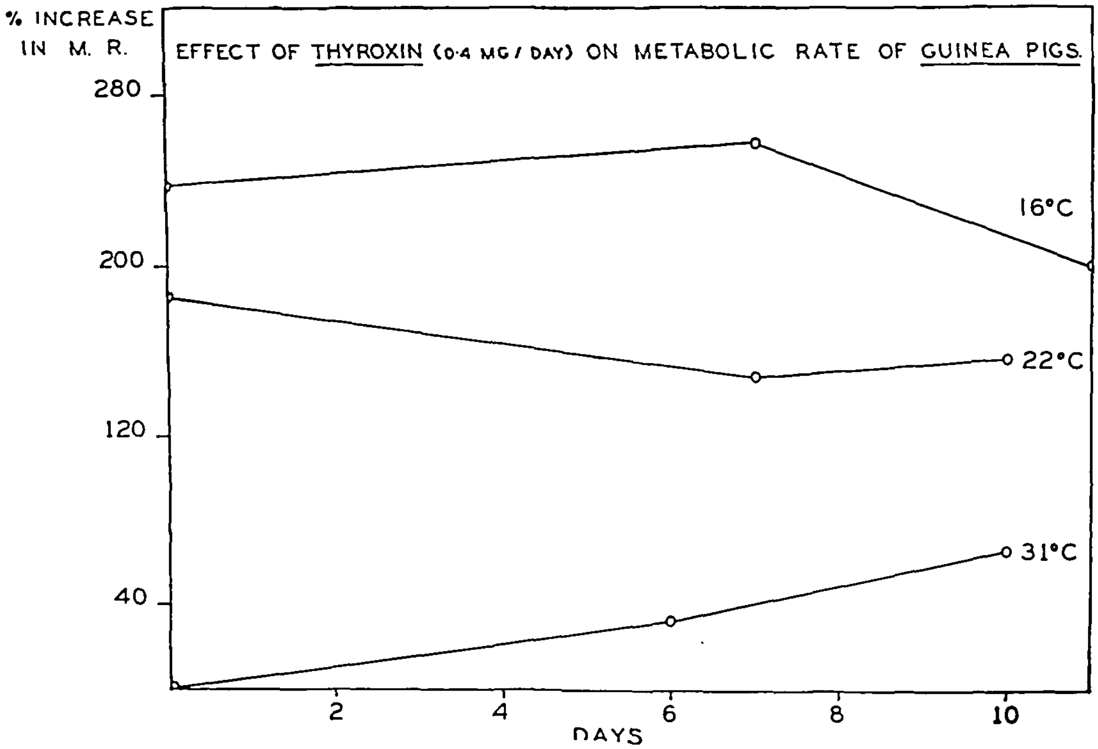
If research leads to the conclusion that the condition is not one of toxic goiter, an unnecessary operation has been avoided The patient has not been made worse The surgeon has been spared self criticism

The most important determination is whether or not the patient is suffering from hyperthyroidism After this has been established, the degree of hyperthyroidism can then be carefully evaluated, and as a matter of fact the degree of hyperthyroidism, at the present time makes very little difference any way because, with the proper use of antithyroid drugs almost any degree of hyperthyroidism can be controlled so that surgery may be done safely

We do not want to give the impression that basal metabolic readings should not be done and should not be given thoughtful consideration They are of the utmost help in studying severely toxic diffuse goiter, or severely toxic adenomatous goiter and in determining the progress of the disease after the diagnosis has been made or after surgery has been done



Showing the effect of injections of thyrotropic hormone on metabolic rate of the guinea pig measured at two temperatures 31°C and 16°C Points on curve represent average of determination on seven animals



Showing the effect of injections of thyroxine upon the metabolic rate of the guinea pig measured at three temperatures, 31° C., 22° C. and 16° C. Points on the curve represent average of determinations on twelve animals.

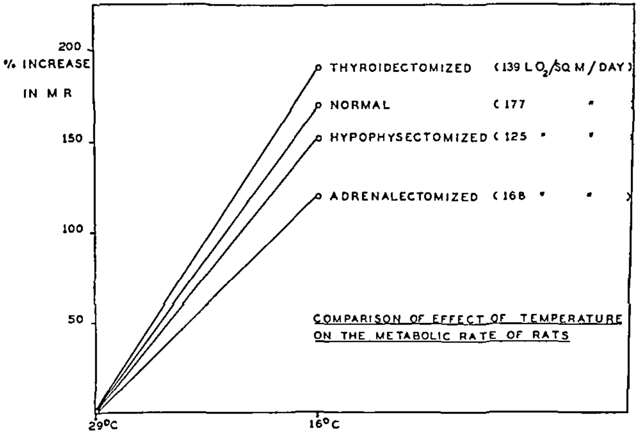
We do believe, however, that an accurate daily recording of the body weight and the pulse rate, if done under similar conditions, is a valuable adjunct to the basal metabolic reading, and will usually give as reliable an indication of the metabolic status as does the reading itself.

If a patient with toxic hyperthyroidism is given Lugol's solution, and placed on a proper thyroid regime, and if the pulse rate tends to come down gradually but constantly, with weight tending to increase constantly, regardless of what the machine shows, the metabolism must be decreasing. By keeping a graph of the pulse rate, and the body weight, one is in a position to determine the optimum time for surgery, in spite of what the basal metabolic reading is. As soon as the weight ceases to increase, and as soon as the pulse ceases to decrease, at which time the metabolism will cease to drop, it is then time to operate even though the metabolism cannot be brought to a normal level.

We have all had experience with the patient suffering from highly toxic goiter, accompanied by a high metabolic reading. This patient after careful preparation has been found to improve clinically as far as the weight, pulse curve and clinical symptoms are concerned, but in whom the basal metabolic rate still remains alarmingly high. Such a patient will usually respond to subtotal thyroidectomy with little or no reaction.

At the present time, with proper use of the antithyroid substances, if there are no untoward reactions to them, it is almost always possible to bring the metabolism to a normal or nearly normal reading if we persist in their use long enough. Of course, it is needless to state, that no patient who has been given propylthiouracil or any similar antithyroid substance should ever be operated upon until the gland has been involuted by the use of iodine.

It has been our experience that the cases with toxic nodular goiter respond favorably to the preoperative use of iodine although not to the same degree as does toxic diffuse goiter A certain number of them will not have their basal metabolic rates return to normal In such cases we must determine whether or not it is wise to operate in spite of the basal metabolic reading We find that most of these cases respond just as well to surgery as do those whose metabolism has returned to absolute normal



Showing the effect of lowered environmental temperature upon the metabolic rates of thyroidectomized, normal, hypophysectomized and adrenalectomized rats Values shown represent averages of determinations on groups of animals from eight to 33 in number

There is a group of nonsurgical thyroid conditions which produce an elevation or a depression as the case may be of the basal metabolic rate Some obese patients are found to have an increased metabolic rate accompanied by tachycardia, nervousness and cardiac palpitation High uric acid, high nonprotein nitrogen polydipsia, polyphagia and an increased galactose tolerance tests are present Many of these individuals have what has been termed thyroid pituitary obesity If thyroid extract and pituitrin are administered, the weight and the metabolic rate decrease, and the accompanying symptoms disappear

Unfortunately, in many patients suffering from the Froelich syndrome the rate of the metabolic reading or the blood cholesterol do not always indicate the amount of thyroid needed to control the symptoms This can only be determined by trial and close observation If the symptoms are aggravated by the administration of thyroid, there is probably no hyperthyroidism present, and the continuation of thyroid medication may cause very critical symptoms One must then look for a pituitary or an adrenal insufficiency If the administration of dessicated suprarenal is promptly followed by improvement, it may be assumed that the condition is one of hypoadrenia

One is sometimes confronted by markedly undernourished patients having a low basal metabolic reading, and in whom there are no other signs of hypothyroidism A low basal rate is frequently found in Addison's disease, lipoid nephrosis, and in malnutrition due to starvation. These patients, like the obese, may be the subjects of adrenal or pituitary deficiency, or a combination of the two. They are made worse by taking thyroid extract. Not infrequently, however, proper doses of adrenal and pituitary substances will dramatically alleviate their symptoms.

The clinical reactions to heat and cold will often aid in differentially diagnosing hypothyroidism from adrenal or pituitary deficiency. In all three diseases, there is a marked intolerance to cold; but in the latter two, namely hypoadrenalism, and hypopituitarism, the symptoms are made worse by extreme heat, whereas in hypothyroidism heat is welcome and well tolerated.

Lerman and Stebbins have warned that extreme caution must be used in giving thyroid extract to patients with pituitary myxedema. Cases have been reported in which coma and death followed its administration. Thyroid may throw a patient with Addison's disease into acute adrenocortical failure.

Because of the bizarre, conflicting and overlapping symptomatology in Simmond's disease (atrophy of adrenals, thyroid, parathyroids, pituitary and ovaries) which may be made worse by thyroid medication, and because this condition may be mistaken for simple hypothyroidism, which usually responds to thyroid medication, it is again emphasized that its administration should be given with great care. Should pituitary myxedema be treated with thyroid, and should untoward symptoms develop, measures to protect adrenocortical failure and hypoglycemia must be instituted. It has been found that in adrenocortical failure the blood sodium and chloride are reduced while the chloride excretion is increased.

Wilder says that a sharp fall in blood sugar with a very gradual increase following the injection of insulin, suggests hypopituitarism, and it is found that the F.S.H. test in the urine is negative. The 17 ketosteroids in the urine are absent. However, these are also found to be absent in females suffering from Addison's disease. The blood cholesterol is low. The response to thyroid medication is unfavorable. Therefore, if average doses of thyroid are given, and are followed by abdominal cramps, anorexia, vomiting, asthenia and collapse, it must be assumed that the patient has pituitary myxedema and not thyroid myxedema. Should these symptoms develop, sodium chloride and fluids should be given intravenously, as well as Gonadgen, in order to protect the adrenals and thus prevent adrenocortical failure.

SUMMARY

1. The variabilities of metabolic rates in patients with nonmetabolic diseases have been mentioned.
2. Some of the conditions and diseases other than those of the thyroid gland which are associated with elevated basal metabolic readings have been discussed.
3. The unreliability of the basal metabolic rate in making the diagnosis of hyperthyroidism has been stressed.
4. The necessity of sound clinical judgment and experienced observation in making the diagnosis of hyperthyroidism has been emphasized.
5. Unnecessary operations which have been done only because of an increased basal metabolic rate without symptoms of clinical hyperthyroidism have been deprecated.
6. Some differences between pituitary myxedema and thyroid myxedema and the possible danger of giving thyroid medication to patients who may have myxedema due to conditions other than hypothyroidism have been stated.

RIASSUNTO

1. Ricorda le variazioni del ricambio basale in pazienti affetti da malattie non metaboliche.
2. Discute talune condizioni e talune malattie associate ad un elevato ricambio basale, senza la necessaria partecipazione della tiroide.
3. Sottolinea la scarsa attendibilita' del motabolismo basale quale metodo diagnostico per l'ipertiroidismo.
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somministrare estratti tiroidei a pazienti nei quali il mixedema non e' dovuto ad un effettivo ipotiroidismo

SUMARIO

Se ha mencionado la variabilidad del metabolismo basal en pacientes con enfermedades no metabolicas

Se ha discutido las condiciones y las enfermedades que producen elevacion del metabolismo basal

El metabolismo basal no es por lotanto criterio infalible en el diagnosis de la tirotoxicosis El criterio clinico es el mas importante y este debe de tomar en consideracion la observacion experimentada de las manifestaciones que presente el paciente

El autor critica las tiroidectomias innecesarias que se han practicado a base de la elevacion del metabolismo sin verdadera manifestaciones clinicas de hipertiroidismo

El autor tambien discute la diferencia entre el mixedema de origen pituitario y tiroideo y los peligros del medicamento tiroideo en las mixedemas no tiroideas

SOMMAIRE

1 Les variations du metabolisme basal chez les malades ne souffrant d'aucune maladie metabolique sont mentionneés et discutees

2 Quelque unes des conditions et maladies autres que celles de la glande thyroide presentant une elévation du metabolisme basal sont discutees

3 On ne doit pas se laser entierement sur le taux du metabolisme normal, pour faire le diagnostique d hyperthyroidisme

4 Il est necessaire que le chirurgien possede un jugement clinique serieux, il doit aussi avoir beaucoup d experience pour faire le diagnostique d'hyperthyroidisme

5 Des operations inutiles ont ete faites parce qu'il y avait une hausse de metabolisme basal sans symptômes cliniques d'hyperthyroidisme

6 Il y a une difference entre le myxedeme pituitaire et le myxédeme thyroide e un danger peut resulter de l'administration d'extrait de thyroide aux malades qui ont un myxedeme dû a des conditions autres que l'hyperthyroidisme

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Radioiodine in Thyroid Disease*

GEORGE M. CURTIS, M.D. AND M. BEEN FERTMAN, M.D.
COLUMBUS, O.

INNOVATIONS in the recognition and management of thyroid disease are of stimulating interest. The discovery of artificially induced radioactivity by Joliot and Curie,[1] preceded by the earlier disclosure of radioactive substances by Becquerel and the Curies, gave to medicine a new and powerful technic. The building of the cyclotron by Lawrence and his associates made this technic practical.[2]

The use of radioactive isotopes for the purpose of "tagging" certain significant elements to be used as "tracers," is based upon their property of being essentially identical with their more common prototypes, yet bearing physical characteristics which may be readily followed. These isotopes, such as radioactive iodine, it was soon recognized, could be employed to study the course and ultimate fate in the body of ingested substances and their subsequent history of synthesis, absorption, distribution, endogenous metabolism and excretion. Prior to the use of radioactive isotopes, there was no known method for differentiating the iodine given during a particular experiment from that already present in the body. The use of radioiodine in the negligible quantities in which it could be employed, lent itself readily to a study of the fate of both administered and nutritional iodine.

In 1938 appeared the first publication concerning the use of radioiodine as an indicator of thyroid physiology, by Hertz and his associates.[3] At that time there was but one radioisotope of iodine available. This radioiodine (I_{128}) had a "half-life" of only 25 minutes, thus restricting the biologic studies to a necessarily brief period. During the year, the number of radioisotopes of iodine was increased to five. These were prepared by cyclotron bombardment of iodine, tellurium or antimony with neutrons, deutrons or helium ions.[4] The bombardment of metallic tellurium with deutrons gives rise to two forms of radioiodine, one with an atomic weight of 130 and a 12.5 hour "half-life," the other with an atomic weight of 131 and a "half-life" of eight days. This latter is experimentally the most valuable, and is now the most widely used clinically.

The demonstrable facts of thyroid physiology indicate that iodine is selectively taken up by the thyroid gland, further that in some measure glandular function is regulated by its iodine content. This is further substantiated by the radioiodine experiments, which demonstrate that iodine is selectively collected by the thyroid under normal conditions and in a definite measurable amount.

Studies with radioiodine soon substantiated the earlier more tedious chemical investigations in demonstrating the great preferential avidity of iodine for thyroid tissue in animals.[5-6-7-8] Far less administered radioiodine is collected by the other organs such as the spleen, liver, pituitary or the muscles.

It was soon found that the time required for the initial collection of iodine by the thyroid cells is determined mainly by the time required for the injected material to reach the thyroid gland.[5] Uptake of iodine by the thyroid is thus extremely rapid.[8] With the introduction of the tracer dose of radioiodine to follow the endogenous metabolism of iodine, Perlman *et al.* found that the thyroid removes iodine from the circulation much faster than it can come into equilibrium with the nonthyroid tissues, and that the subsequent release of radioiodine from the gland is much slower than its initial uptake.[9]

The radioiodine collected by the thyroid is influenced by the amount of iodine administered, previous iodine administration, the degree of thyroid stimulation or depression and the existence of thyroid disease. For normal thyroid glands, the per cent of iodine collected increases as the intake is decreased.[5-6-9] It is this relatively large percentage uptake from *small* injections which may account for the physiologic maintenance of normal thyroid function on the minute quantities of iodine usually found in the diet.[5] This rapidity of utilization of small amounts points toward the necessity of a regular iodine intake The rat thyroid gland after being saturated with iodine, recovers its ability to fix *iodine in a little more than three days*[6]

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*From the Department of Research Surgery of the Ohio State University. Aided by a Grant from the Mary [illegible] Curtis Fund for Surgical Research of the Ohio State University.

In 1938 and again in 1940 Hertz and his associates,[3-5] using radioiodine, showed that hyperplastic thyroids fix iodine more rapidly than normal glands Rat thyroids, rendered hyperplastic by an iodine-deficient diet, acquire an increased ability to fix iodine[10] The resultant thyroid and hypophyseal changes in these goitrous animals indicate an excessive release of thyrotropic factor from the pituitary.[10] Thyroids of hypophysectomized animals collect much less radioiodine than thyroids of intact animals, yet still exceed other body tissues in this ability.[6] On the other hand, thyroids of animals treated with thyrotropic hormone collect more radioiodine than the glands of normal controls.[6-11]

The next step in the development of further understanding of thyroid function was logically a study of the mechanism of iodine fixation and of hormone synthesis by the thyroid gland.

Iodine upon being absorbed by the thyroid gland enters into at least four separate phases:[12] 1. iodine ions in the thyroid follicular cells; 2 a bound iodine fraction known as "iodinase"; 3. diiodotyrosine and 4 thyroxine When tracer iodide is first administered[12] it accumulates largely in the gland at phase one. Near the end of the experiment it will exist largely in phase four. The radioiodine does not appear uniformly distributed throughout all phases Radioiodine studies soon demonstrated that iodine is quickly brought to the follicular cells by the blood stream and rapidly converted into diiodotyrosine and thyroxine; moreover, that within a matter of a few hours these organic iodine compounds may return again to the circulation.[9-13] With increasing time intervals subsequent to radioiodine administration, concentration is first demonstrable in the diiodotyrosine-like fraction; the *longer the time interval, the more is found in* the thyroxine-like fraction.[9, 13] It was further demonstrated that the diiodotyrosine fraction appears to be the natural precursor of thyroxine.[14]

In addition to thyrotropic hormone[6-11] other substances may affect the ability of the thyroid cell to collect and fix radioiodine.[15] Administration of relatively large amounts of inorganic iodide blocks the subsequent forma*tion of organic iodine in the thyroid gland*[16] This block is related to the level of the plasma iodine. When this is above 20 to 35 micrograms percent, there is no appreciable conversion of inorganic iodide to organic forms within the gland. Conversion of diiodotyrosine to thyroxine was considered slower when large amounts of iodide were injected.[16]

Further increase in the plasma iodine, probably by influencing the level of inorganic iodine in the gland, is an inhibitor of normal thyroid function.[17] This period of inhibition can be prolonged by preventing the escape of administered iodine through the excision of the kidney.[17] This inhibition of the organic-binding of iodine by the gland when the plasma iodine is kept high may be offered as a part of the mechanism of response of the hyperthyroid patient to iodine therapy.

In addition to the iodides there are other substances which can be demonstrated by the use of radioiodine to influence thyroid function. Some of these, cyanides and sulfides for example, as demonstrated by the amount of accumulation of radioiodine by thyroid slices, may act by hindering the collection of iodide.[18] Others, such as various sulfonamides,[18] and particularly thiouracil and its related compounds, may inhibit the formation of diiodotyrosine and thyroxine[19] without affecting the iodine concentrating power of the thyroid. Potassium thiocyanate not only depresses the chemical conversion of inorganic iodine by thyroid slices, but also prevents the collection of iodine.[19]

The administration of thiouracil depresses the uptake of radioiodine by the intact thyroid gland.[20] Recovery, as judged by the iodine concentration capacity of the thyroid, as well as the amounts of radiotyrosine and radiodiiodotyrosine formed, is complete two weeks after this goitrogen has been discontinued. *The degree to which thiouracil and its allies* prevents the formation of an iodinated hormone,[21] varies with the particular agent administered and also with the animal species.

The iodine collecting capacity of thyroids made goitrous by means of various chemical agents, appears to be partly a function of the time elapsing after the last administration of the goitrogenic substance.[22] This is borne out by the administration of thiocyanate, which depresses the uptake of radioiodine only so long as high concentrations of the drug remain in the circulation.[22]

The goitrogenic effect of various foods may also be studied by observing the subsequent inhibition of radioiodine uptake. Of 61 different foods thus tested in 100 different subjects,[23] rutabagas were found to contain the greatest antithyroid activity. Vegetables were more active than animal products.

The use of radioisotopes has made possible the study of the metabolic fate of active drugs, such as thyroxine. When this hormone, tagged with radioiodine, is injected into rats, more than 50 percent of the administered dose may be recovered after two hours; in the gastrointestinal tract, liver and in the pancreas, mainly in an unaltered form.[24] The thyroxine appears to enter the intestinal tract by way of the liver. These results are clinically interesting because of the apparent relationship between thyroid and hepatic function.

The rate of conversion of injected radioactive inorganic iodine into protein-bound plasma iodine has been suggested as a useful guide to thyroid activity.[25] Urinary excretion is likewise of possible usefulness in making a differential diagnosis,[26-27-28] especially when routine methods are inapplicable, for example where the BMR is high due to nonthyroid factors.[26]

Keating and his associates found the urinary excretion of tracer doses of radioiodine less than normal in hyperthyroid patients.[28] McArthur *et al* demonstrated that a low urinary excretion of radioiodine is helpful in establishing a diagnosis of Graves' disease while a high excretion helps in excluding such a diagnosis.[27] Skanse and Riggs[29] using this technic, were thus able to diagnosis "*thyrotoxicosis factitia*" (self-induced thyrotoxicosis), since the urinary excretion of radioiodine was higher than normal.

Direct measurement of the iodine uptake by the thyroid has been suggested as an even more accurate method for demonstrating an index of thyroid function.[30] Werner and his associates[31] found the normal uptake to be 20-30 percent of the administered tracer dose of 50-75 microcuries. Anything more than 40 percent was regarded as definitely hyperthyroidism; anything less than 10 percent, as hypothyroidism.

The concentration of radioisotopes which can be fixed and maintained in various types of tissue, fluctuates widely.[12] Several factors are involved in the turnover rate, such as the natural avidity for iodine, the stage of the disease, differentiation of the tissue and topographical variations of the specimen.

Employing the radioautographic technic, Leblond demonstrated that most of the radioiodine, administered in varying doses, was deposited in the colloid rather than in the cells.[32] A similar preferential distribution was shown in pituitary-treated and in hypophysectomized animals.

In our clinic, studies of the goiters of two patients who had received radioiodine prior to thyroidectomy; one a diffuse colloid goiter and the other a diffuse hyperplastic goiter with hyperthyroidism (exophthalmic goiter), also showed a preferential distribution in the colloid.[33] Hamilton *et al.*, employing the autographic method, found that in goitrous glands radioiodine was in general concentrated in the most actively functioning parts of the goiter.[34]

Further studies in our laboratories, of the fate of radioiodine in six nodular goiters showed that nodular formation and particularly one nodule of a fetal adenomatous type, were less active than the surrounding thyroid tissue.[35] The histologic pictures of the nodules of the six nodular goiters showed wide variations. The nodules of the patients with toxic nodular as well as of exophthalmic goiter were of the hyperplasia-involution type (not "true adenomas"). All nodules showed a decreased function as compared to the corresponding paranodular thyroid tissues. This was demonstrated by a smaller iodine content in the nodules, a lesser iodine fixation and a slower turnover of iodine.[35a] Moreover, the formation of thyroxine was comparatively minimal in the nodular tissue.

The nodules of patients with nontoxic nodular goiter, toxic nodular goiter and the so-called fetal adenoma studied appeared functionally autonomous.[35b] They showed less avidity for administered radioiodine and also much less thyroxine and diiodotyrosine production than the surrounding thyroid tissue.

The diffuse goitrous tissue of two patients with nontoxic diffuse colloid goiter[35b] showed a great avidity for iodine, but its ability to produce thyroxine and diiodotyrosine did not appear increased. The diffuse hyperplastic tissue of a patient with exophthalmic goiter showed the greatest avidity for iodine and the greatest ability to produce thyroxine and diiodotyrosine.

An extensive study involving 94 cases of nodular goiter, 16 of these with carcinoma, was subsequently undertaken by Dobyns and Lennon.[3] They found a parallelism between the degree of function and cellular differentiation of the adenoma, with certain exceptions. There were adenomas with cellular hypertrophy and hyperplasia which were hyperfunctioning, as well as adenomas both with hypertrophy and hyperplasia which barely functioned at all. This latter group with negligible function showed an increased variability in cell height. In this respect they were thought to shade off into the class of tumors known as papillary adenocarcinomata.

At first it was reported that malignant thyroid tumors have no avidity for radioiodine, while the surrounding normal tissue colloid did.[34] However, the work of Dobyns and Lennon[36] as well as that of other investigators[37, 38] soon demonstrated that there are exceptions, depending upon the type of tumor, whether primary or metastatic. The uptake of iodine was found closely linked with the structural qualities of the tumor—the cellular arrangement in the follicular pattern and the presence of colloid-like material. Moreover, the degree of function of these tumors roughly parallels the histologic differentiation. This is recognized in radiotherapy.

Radioautograms were made of the thyroid glands of 47 selected patients with carcinoma of the thyroid given tracer or therapeutic doses of radioiodine (I_{131}) prior to surgery. Twenty showed retention of the isotope in some portion of the neoplastic areas.[38] Papillary adenocarcinoma of the thyroid retained no radioactive iodine; other papillary adenocarcinomas with follicular or alveolar patterns showed retention in five of eight cases, while two thirds of the carcinomas showing follicular and alveolar types throughout, stored radioiodine. Differences in the amount of radioiodine collected were also observed in other types of malignant thyroid tumors. In only two histologic components of thyroid carcinoma was radioiodine found—in the alveoli and even more in the follicles with colloid.

Beginning with the work of Hamilton and Lawrence,[9] who reported almost complete destruction of the thyroids of dogs and rabbits with radioiodine (I_{131}), without evidence of damage to other body tissues, radioiodine has been used therapeutically for patients, with increasing frequency, in the treatment of hyperthyroidism and now more in the treatment of more "hopeless" patients with malignancy of the thyroid.

Radioiodine given in adequate doses will subtotally inactivate the hyperfunctioning thyroids in patients with Graves' disease and thereby produce what has been considered a satisfactory remission of the symptoms and signs of hyperthyroidism.[40] Thus far, during the brief span of years over which this form of therapy has been applied, the chief complication has been myxedema and this is reported in but a small percentage of cases.[40, 41, 42, 43]

A three to five year report on the early experiments with radioiodine therapy of 29 patients with hyperthyroidism showed a high effectiveness in 80 percent[41] of the cases. Similar results were obtained by Chapman and Evans.[42] Chapman[43] reported that of 65 patients treated with the 12 hour isotope, 51 responded and continued well, 11 were overtreated and developed hypothyroidism and three improved but remained toxic. With the eight day isotope (I_{131}) available more recently, results showed the average interval for attaining a normal basal metabolism to be about two months. No relapses or recurrences were noted. A few developed myxedema and none in this particular series had radiation sickness. Radioiodine (I_{131}) was thus considered an effective therapeutic agent. The possibility of a late carcinogenic effect, however, can only be settled after a long period of subsequent observation.

In recurrent toxic goiter which did not respond to other treatment, an 89 percent remission rate was noted subsequent to the administration of radioiodine. This was considered an indication of the value of this form of therapy in the treatment of this type of hyperthyroidism.[30] Its value in primary hyperthyroidism as compared with surgery combined with other forms of treatment, was not so striking.

In view of the reported successes of radioiodine therapy in Graves' disease, this type of treatment was instituted in the management of thyroid tumors. Meanwhile, the groundwork was being laid with autographic and chemical studies showing the extent to which these tissues could be expected to collect radioiodine.[35-36-37-38]

The limitation of the ability of these tumors to collect iodine, which would diminish the success of radioiodine therapy, made it necessary to find some means of increasing this particular function of these tumors as well as of their metastases.

Attempts to increase the efficacy of radioiodine therapy were next undertaken. They are of particular interest because they may give a clue, in particular, to the handling of the otherwise unmanageable metastases of even other tumors throughout the body. Seidlin and his associates[44] found that the uptake by metastatic thyroid carcinoma is more closely correlated with the degree of preceding thyroidectomy than with the histologic structure of the metastasis. In those patients in whom initial studies with radioiodine do not show concentration in the metastases, such concentration could be induced by either thyroidectomy (surgical, radiation or chemical) or by injections of thyrotropic hormone.

Seidlin further found that[45] metastases are unlikely to show any radioiodine uptake unless the primary tumor has destroyed most of the original non-neoplastic thyroid gland. Thus, if no radioiodine is taken up by the metastases, a complete thyroidectomy in his opinion is indicated. About five or six weeks after thyroidectomy, or earlier, the metastases begin to show an uptake of radioiodine. Large doses should then be continued at fairly frequent intervals.

In 27 patients, studied by Rawson and his group,[37] total thyroidectomy or the administration of large doses of radioiodine led to significant increases in the iodine-collecting capacity of the metastases. This was noted in follicular or solid adenomatous types, however, and not in papillary adenocarcinomas. The use of thyroid stimulating hormone along with the thyroidectomy would further increase the avidity of the metastases to take up radioiodine. The administration of thiouracil resulted in myxedema but did not produce a block to the utilization of iodine, comparable to that usually observed in patients with Graves' disease when receiving this drug. These observations, it was thought, might indicate that the mechanism by which functioning thyroid carcinomata concentrate iodine, is of a different nature than that of normal thyroid tissue.

While there have been striking tumor regressions and over-all improvement in physical well-being, evidence is still lacking that such a remission will be permanent. Also, fairly serious complications of this form of therapy have been reported.[46]

The use of radioiodine in the investigation and management of thyroid disease has been of stimulating interest. The findings, however, are in the developmental phase and should be carefully evaluated before any final conclusion may be drawn. Experience is not yet sufficient to warrant any widespread general use in therapy.

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AMONG THE SPEAKERS AT THE SURGICAL DAYS IN VIENNA
(Austrian Chapter, International College of Surgeons)
ON JULY 1 AND 2, 1949
ARE THE FOLLOWING

FINSTERER, MANDL, PAOLUCCI, DEMEL, SCHÖNBAUER, DOGLIOTTI, PLENK, ERLACHER, SCHLANDER, CHIARI, LORENZ, HARTWICH, ANTOINE, ZACHERL, NAVRATIL, HEIDLER, WERNER, RICHTER, ZDANSKI, ZAUNBAUER, STEINDL, STARLINGER, HRYNTSCHAK, THOREK (MAX), HUBER, REISE, KNOFLACK, McNEALY, THOREK (PHILIP), HALL, ANDREASEN, SOLERROIG, CUNHA, ATKINSON, ALEXANDER, JEWETT, FOURNIER and OTHERS.

Thyroidectomy—The Prevention and Treatment of Complications

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THYROID disease is unequalled in possibilities of complications following surgery, for as Hertzler[1] says "Through the nature of the disease, we have nervous, circulatory, nutritional manifestations, with limitless possibilities" Thus, for a surgeon to accept full responsibility of the thyrotoxic case would be unfair to the patient, to society and to himself The burden of diagnosis is shared in the cooperation with the radiologist the laryngologist, and the internist The anesthetist participates in the successful outcome of surgery, even with operations accomplished under local anesthetic

The decision for operation should be based upon a comprehensive physical examination and a complete investigation of the patient's mode of life, occupation medical history, mental status, and current symptoms The question of *when* to operate must be determined by examination findings and the patient's response to any preparatory procedures which may be indicated Surgery never should be undertaken less than several weeks after an acute respiratory infection has subsided and oral hygiene, so often neglected preoperatively, must be routine as with any surgery that requires bed rest I am convinced that more postoperative throat and chest complications result from diseased or infected teeth than previously have been acknowledged The complete confidence of the patient in the attending doctors is an important consideration in the prevention of the anxiety and hysteric states often encountered postoperatively in maladjusted patients

The thyrotoxic patient must be evaluated by the internist, especially the cardiac aspects of the case which to some degree are coincident with all toxic thyroid disturbance The individuals with heart damage require more than passing comment for where there is, or has been, heart involvement, the regimen of a cardiac patient is necessary Administration of propylthiouracil to the thyrotoxic patient should be initiated and continued, accompanied by frequent determinations of the basal metabolic rate and laboratory examinations of blood, until the B M R is lowered or stabilized Following discontinuance of the drug, Lugol's solution is then advocated for a time prior to operation

The surgeon must be familiar with the gross pathology and anatomy of the thyroid gland and of its associated structures Physical examination or routine fluoroscopic and roentgenographic investigation may indicate the presence of a substernal goiter and determine the position of the trachea Both pre and postoperative visualization of the vocal cords in patients, who have had voice changes or previously have been operated, is essential Laryngeal examination preoperatively shows in many cases some lack of mobility of one or both vocal cords

Pemberton[2] states that the first group of hazards includes not only accidents of technic, which are for the most part avoidable, but also errors of surgical judgment, particularly in deciding when to operate and in selecting the surgical procedure The second group of hazards are presented by cases in which other diseases are associated with exophthalmic goiter He believes that liver failure occurs consequent to thyroid disease and that hepatic changes, which perhaps are most serious, may be prevented by early surgical treatment However, a careful, unhurried, approach to operation is absolutely essential Hagen[3] emphasizes that the surgeon operates to cure and recurrences are best prevented by a careful appraisal of the patient

Liberal thyroidectomy and careful follow-up will eliminate the factors responsible for the initiation of the disease The physiologic restoration of the thyrotoxic patient requires something more than the mere routine of rest. Lugol's solution, sedation, and vitamins "BW and C." These are important, perhaps vital, but they are with the exception of the vitamins merely transient accessories to the final conquest of the malevolent disease. Complete thyroidectomy, according to the teachings of Hertzler, is being more generally accepted, especially by the younger surgeons and apparently is not necessarily followed by the myxedematous stage which has been the subject of controversy. Partial thyroidectomy is a technic not of choice, but of necessity. Prudence may obligate a surgeon to choose partial thyroidectomy before or during an operation, but we know from experience that if we operate in the true incipient stage we will have almost one hundred percent permanent cures and practically no deaths.[4] DeCourcy[5] states it is better to remove too much, rather than too little of the thyroid gland.

Despite the best medicosurgical judgment and experience every surgeon occasionally meets misfortune owing to conditions which cannot be foreseen. Death following thyroidectomy, in the light of our present day knowledge, should be rare. However, since we are dealing with the human body and other complex factors, deaths will continue to occur, even with the most careful preoperative examination, preparation, and ideal operative procedure and careful postoperative care. These are as unpredictable as life itself. It behooves us to realize this and adjust ourselves to the acceptance of all possible assistance—whether it be laboratory and clinical service or social and professional advice.

Among the contraindications to immediate thyroidectomy are: uncertain diagnosis; previous indiscriminate use of iodine, especially in nontoxic adenomatous glands; failure to respond to preoperative therapy; persistent nausea and vomiting; infection which might be eliminated; unfavorable cardiac conditions; and, deterrant behavior of the patient. Dixon[6] believes that mortality is usually attributable to errors in preoperative preparation, in selection of time for surgery, and to postoperative complications. As possible causes, or contributing factors, I believe we should add to these: incorrect diagnosis; hemorrhage; tracheal collapse; thyroid crisis; toxemia; complicating liver damage; embolism; complicating carcinomatosis; and inexperienced surgical judgment and comprehension of existing pathology.

OPERATIVE AND POSTOPERATIVE COMPLICATIONS OF THYROIDECTOMY

Many surgeons prefer a planned incision with good exposure, ample division of the muscles for proper visualization of the gland and structures, rather than a smaller incision with greater trauma from the increased retraction required. Clear observation and unhampered dissection anatomically is better surgery than blind removal or blunt separation by finger elevation and retraction of the gland. Boehem[7] describes special anatomical dissection with control of bleeding, especially in hypertension cases. If bleeding cannot be brought under control, it is better surgical judgment to pack a wound and discontinue an operation, than to chance additional trauma.

Aspiration of large cystic adenomata prior to removal, especially those of the substernal type, frequently prevents damage to adjacent vessels from tugging and tearing. Lahey[8] suggests the employment of a semiflexible tube in intrathoracic goiter prior to operation.

Hemorrhage, especially from the superior thyroid artery, is always a danger. To prevent the ligature on the superior thyroid artery slipping, transfixion of the pole is suggested. Meticulous ligation of all bleeding points with isolation of the veins and arteries from adjacent tissues and utilization of fine ligatures are necessary to minimize subsequent serum formation. Encouraging straining, coughing, and gagging by the patient before closure of the wound should be routine to assure the surgeon of complete hemastasis. Drainage may be used if considered advisable but, if employed, early removal is advocated to reduce scar formation. If a hematoma develops it must be evacuated even if reopening of the incision is necessary. Wound infection is rare and must be attributed to uncontrolled technic, or self-infection. When encountered treatment is by inside open drainage and chemotherapy and secondary closure.

The prevention of the many complications which arise in the postoperative recovery of the thyroidectomized patient has not been stressed sufficiently in the literature. Clute[9] feels that if there is any single complication following thyroidectomy, which is more trying than any other in the first few days or weeks of convalescence, it is the development of serum underneath the skin flap and that serum follows incomplete hemostasis or the inclusion of too large pieces of parathyroid muscles or large pedicles and the use of coarse ligatures

Almost any extensive operation within the neck is followed by some disturbance of speech owing to congestion of mucous in the larynx or trachea, to manipulation, or to interference with one or both recurrent laryngeal nerves Lahey[8] *for years has advocated visualization* of the recurrent laryngeal nerve and his policy of routine demonstration of this important structure, although not accepted by all thyroid surgeons, has proved itself to the satisfaction of a great number

The postoperative neck and scapular pains which are usual complaints of older patients are attributable to faulty position of the patient during operation The difficulty in breathing and swallowing frequently encountered, usually results from trauma of the trachea or edema of the larynx and esophagus It may be relieved by bending the head forward, encouraging the liberal use of fluids and stimulating cough reflexes

Seabrook[10] considers embolism an important complication in thyroid surgery and in 1929 published six cases Larson[11] reports that embolism may result from introduction of air into the blood stream through veins which *have been cut necessarily during operation, or* from trauma or accidental tearing of veins which has occurred without becoming apparent He advocated ligature before division of any vessel of size If the condition has developed, administration of caffeine and artificial respiration are indicated

Sommer[12] believes that a considerable percentage of the patients who die from hyperthyroidism, do so because of embolism These deaths occur usually in the face of a long standing disease

Tetany may develop seven to 12 hours following thyroidectomy from injury or removal of one or more parathyroid glands or interference with the circulation of blood to them The parathyroids usually are situated outside of the thyroid gland, but frequently at times are found closely associated with, or imbedded in, the gland itself The surgeon must recognize these important bodies to avoid interference with their function by injury during operation

Symptoms of tetany also may be attributable to hemorrhage, to pressure from formation of a hematoma, or to edema from trauma to the adjacent tissue Pemberton[13] states that ligation of the inferior artery proximal to entrance into the thyroid gland causes no interference with the parathyroids However, blood calcium estimation and laryngeal ob*servation preoperatively are mandatory*, especially in cases of reoperation Trousseau's Sign (carpopedal spasm) produced by pressure on the arm is an indication of beginning tetany Tetany usually is evidenced initially by restlessness, twitching, cramps and spasms of hands and feet

Tetany may be transitory and respond to administration daily of 10 cc of five percent solution of calcium chloride, intravenously accompanied by vitamin B therapy With mild cases 10 grams of calcium chloride per day orally, or cod liver oil may be used with *success Some surgeons routinely give patients* postoperatively five cc of five percent calcium chloride per day intravenously, or cod liver oil by mouth for a period of time No sound reason to condemn this procedure is apparent Severe tetany may require administration of parathyroid extract accompanied by calcium gluconate intravenously, in amounts and *over the period of time necessary to eliminate* symptoms of the deficiency

The postoperative crisis or storm which occasionally follows thyroidectomy usually develops about 36 hours after operation with rapid pulse, fever, and sometimes delirium Inadequate preparation of the patient is commonly given as the cause When encountered, crisis may be treated satisfactorily by intravenous chloride and sodium bicarbonate, vitamin "B three times daily, 0 5 gm of liver extract per day (2), sedation of choice, and cooling ice bags

Injuries to the recurrent laryngeal nerve has been emphasized by Lahey,[8] Mulligan,[14] Green,[15] Scheicher,[16] and Bachhuber[17] Different exposures, methods of enucleation, and advantages of freeing the lower pole first, or the reverse, have been debated for years, which has proved to the author that a specific standard cannot be established. The recurrent laryngeal nerve may occupy different positions, especially in relation to the inferior thyroid artery, but if the inferior artery is ligated well lateral to the capsule, the possibility of grasping the nerve is lessened. In complete thyroidectomy it is conceded that visualization of the nerves is essential. However, if a subtotal thyroidectomy, as in many adenomatous glands, suffices, I see no reason to seek trouble by invading a mined field.

When interference with the recurrent laryngeal nerve is suspected or damage actually has occurred, Lahey[8] advocates repair with china silk, on blood vessel needles. He also states that those cases recognized in the postoperative convalescence, must be repaired in the following three-month period. Edema of the oversewn capsule may be responsible for some voice change or temporary cord paralysis.

Laszo[18] calls attention to difficulty in swallowing which may result from injury to the laryngeal nerve, which may be caught with the suture when ligating the superior thyroid artery. If the condition of dysphasia persists after six months it is probably nervous in origin and may be verified by fluoroscope examination with a barium meal and explained to the patient.

Severe disturbance six to eight months following thyroidectomy is probably the result of scar formation and requires surgery to free the cord. A paralysis of one cord is usually compensated in time. Paralysis of both cords, due to secondary edema, produces voice change which is probably temporary and will correct itself. But, if improvement does not occur—tracheotomy is indicated, and perhaps the King operation will have to be considered. For permanent bilateral abductor paralysis Lahey suggests a tracheotomy tube fitted with a Tucker valve, which permits the patient to retain an excellent voice without closing the tube by digital methods. If the tube is not well tolerated, submucous resection of the cord is indicated

Laryngitis or tracheitis may be instigated by aspiration, infection, or trauma from operative manipulation or interference. The condition should be countered by measures of stimulation or interference with nerve control: 1. Inhalation from steam tent, with Balsam of Peru added; 2. syrup of hydriodic acid, brams 1, p.r.n.; 3. lemon drinks; 4. force fluids; 5. chewing gum, to promote salivation; 6. chemotherapy of choice.

Tinker,[19] in 1940 advocated tracheotomy prior to operation in carcinoma of the thyroid.

In postoperative trachea distress, a temporary tracheotomy may be required for only a few days, and is better surgical judgment than a sleepless night from regret. Tracheotomy is usually done about the second ring and may require a tube larger than the one ordinarily used in a tracheotomy. The procedure may be indicated by collapse of the trachea following relief of the pressure on its thinned-out wall; by persistent cyanosis, even after the relief of hemorrhage, and by abductor paralysis from interference with the recurrent nerve.

Intrathoracic goiter can be differentiated from a fibroma arising in the esophageal wall by fluoroscopic observation of a barium meal.[20] Carotid sinus syndrome is corrected by 10 cc. of one percent procaine solution injected at bifurcation of carotids and 0.01 grain of atropine sulphate intravenously.[21] In diabetes, thyrotoxicosis may be coexistent and each may aggravate the other. Control of the diabetes is absolutely essential. In some cases thyroidectomy has aided the diabetic therapy: in others, control of the diabetic condition has reduced the toxicity of the thyroid.

Massive collapse or Atelectasis is not a common postoperative complication, but is frequently overlooked temporarily. It is usually portrayed by elevation of temperature (103°-105°), increased pulse rate, dyspnea, and apprehension of the patient produced by inspissated mucous.[22] This complication can be averted by good nursing care, which includes changing the position of the patient frequently, encouraging coughing, and assuring liberal fluid intake. Atelectasis may be verified by x-ray examination of the chest and a sharp, severe slap on the back may encourage the dislodgment of the mucous plug, according to Rustin[22] from his experience with the anesthetic service of the Royal Canadian Army Medical Corps. Failure of this procedure necessitates bronchoscopic examination and removal of the obstruction in the bronchial tree by aspiration

Pneumonia still occurs occasionally following thyroidectomy, but today is less frequent Careful preoperative examination, preparation, treatment, and dental hygiene have been followed and surgery is supplemented with the postoperative use of oxygen and chemotherapy Pneumonia should be rare

Pulmonary abscesses result from unrecognized, initial bronchial obstruction with resulting infection and abscess formation and are treated by bronchoscopy aspiration, irrigation, and chemotherapy

Toxemia may follow thyroidectomy, frequently as a result of incomplete examination and neglect of existing preoperative condition *The inciting factor also may be the contrac*tion of an illness at the time of operation or immediately thereafter Most of us are too prone to classify all toxemias in the latter category Fortunately, with the newer chemotherapeutic drugs and antibiotic agents these conditions respond favorably

Exophthalmous usually disappears after the *patient has been thyroidectomized, but in some* instances it persists even with improvement of all other symptoms Other cases after operation show progressive exophthalmous though the condition had not existed previously Ceballos[23] speaks of this as malignant exophthalmous and quotes Lahey as stating that loss of sight menaces in all cases of pre and post operative exophthalmous On the other hand, Hertzler has never seen a case of malignant exophthalmous The Naffzeger operation probably offers the best hope for recovery but should not be delayed until ulceration of the cornea is established

An excellent scar following thyroidectomy is determined by a carefully planned incision with meticulous control of all bleeding points and precise closure employing fine ligature material with close approximation of the skin edges preferably with clips and early removal of drains if used Serum should be recognized early and evacuated immediately Alcohol dressings on the neck for the first three days postoperatively and early massage if edema is present, enhance clean loose scar formation However, if dimpling of the scar results and is not responding to massage, early undercutting followed by massage is usually advantageous Keloids respond fairly satisfactorily to low doses of x ray

When confronting a patient at "followup" examination a surgeon may be embarrassed by having overlooked the pyramidal lobe at operation months earlier especially if the individual presents symptoms of recurring hyperthyroidism Pemberton[13] says that myxedema may follow thyroidectomy and upon treatment with thyroid extract symptoms of hyperthyroidism may reappear This situation may be averted by care in administering thyroid extract postoperatively One half grain three times each day for a period of 20 days followed by a recheck of symptoms is recommended as preferable to the usual one grain *per day for an indefinite period*

The term recurrent thyrotoxicosis has been loosely used and there are many exponents of the thesis that a so called recurrent thyroid is only an incomplete thyroidectomy Bothe[24] stated that hyperthyroidism recurs after thyroidectomy in two of three patients Thompson[25] makes a distinction between recurrence *and persistence of thyrotoxicosis Recurrences* are best prevented by a careful appraisal of the patient, by a liberal thyroidectomy, and by a carefully planned follow up that will eliminate the factors responsible for the initiation of the disease[3]

A few years have brought a tremendous increase in our knowledge of thyroid disease and its concomitant effects upon body processes, and in the methods of treating the disease and its sequelae Concerted efforts of surgeons, physicians, especially internists, physicists, and chemists have resulted in a vast reduction of mortality and morbidity from disturbances of thyroid function With continued research for better methods of diagnosis better technics of surgery, better control of patients during operation with adjuvant procedures and improved facilities for averting and treating postoperative complications—we may soon have the means for prevention as well as cure of the hyperthyroid individual

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Partial and Total Intrathoracic Goiter

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THE diagnosis of intrathoracic goiter is often delayed and its presence is usually not determined until some one particularly interested in thyroid disease suspects an intrathoracic projection and takes a roentgenogram of the chest Sometimes a nodular mass is felt above the clavicle and a suspicion is aroused that there is a tumor or mass in the upper mediastinum Mechanical symptoms of cough, shortness of breath difficulty in swallowing and hoarseness are too often not attributed to intrathoracic pressure

Goiter was first noticed to extend deep into the thoracic cavity in 1749 by Haller, an anatomist Dubourg in 1826 reported the first clinical observation of intrathoracic goiterous projections Malignancy of an intrathoracic goiter was noticed by Adelmann in 1828 Malord in 1879 reviewed the French literature and found 11 cases With the discovery of the x ray in 1895, the diagnosis became more apparent Wuhrmann in 1899 analyzed the reports of 91 cases of which there were 16 malignancies

The condition is more common in women and should be naturally so, as nodular goiter presents itself more frequently in the female sex Jackson found 23 total intrathoracic goiters in women out of a series of 25 cases

In goiterous belts the partial form of intrathoracic goiter may range as high as 25 or 30 percent, while in non goiterous sections it is reduced to 10 percent or less

Crile reports an instance of less than one percent I have found 48 partial intrathoracic goiters and seven total masses in 650 cases

What really constitutes an intrathoracic goiter rests largely with the conception of the amount of gland necessary to protrude into the chest before such a term is appropriate To some it may appear that a goiter is intrathoracic when a relatively small portion extends into the thorax, to others it may seem necessary that the vast majority of the goiterous mass should be in the thorax before such a term is applicable I believe the mass should extend down to or near the aorta Certainly a large portion should be found extending well through the thoracic aperture in order for the term intrathoracic goiter to be accurate In fact, a truly intrathoracic goiter is one in which the entire mass is within the thorax

DEFINITION AND CLASSIFICATION

Curtis has clearly divided projections through the thoracic aperture into the chest by defining the aperture itself He describes the plane of the thoracic aperture as an imaginary plane extending from the top of the first dorsal vertebra to the superior part of the manubrium and spreading out laterally over the first ribs Goiters protruding below this plane are classified as deep cervical partially intrathoracic, and totally intrathoracic The deep cervical lesions are those masses whose lower portions protrude below this plane but on swallowing the lowest projection can be elevated above this imaginary plane and palpated in the neck

The partially placed intrathoracic goiter extends deep into the chest and does not arise into the neck on swallowing, nor can it be elevated above the thoracic aperture at will These protruding masses sometimes become fixed against the first rib by a deep groove and do not move freely up and down on swallowing or with respiration This fixation often causes serious respiratory difficulty by deviation and narrowing of the trachea

The complete or totally intrathoracic goiters are entirely placed within the thorax and no portion arises up into the neck under any circumstances It doesn t matter whether this goiterous mass is found wholly behind the sternum in the mediastinum or deep within the chest It is intrathoracic, and the term is still applicable although the classification of sub sternal, mediastinal lateral, pre vasal and post vasal or post visceral are likewise appropriate and more descriptive

It is interesting to note that the only emer gency that occurs in thyroid surgery is that when a pedunculated cervical mass descends into the chest and becomes impinged beneath the first rib and produces an acute angulation or compression of the trachea with resulting respiratory obstruction.

METHOD OF DEVELOPMENT

The intrathoracic position is assumed from one of three causes. It may be an independent growth of an aberrant portion of the original thyroid which has become detached from the parent gland in its descent during fetal life or thyroid tissue may have been carried along with the thymic stalk. Or, what is more probable, it is the direct extension of a discrete nodule in either of the lower poles or the isthmus of the thyroid gland. It is true that small remnants of the thyroid may be detached during fetal descent and live independently of the parent gland and, subsequently, develop thyroid pathology in unusual locations. Such descent to the depth of the thorax is rare. This may be said, likewise, of remnants that descend with the thymus.

An intrathoracic goiter results, therefore, from the downward growth of an isolated nodule in one of the lower poles or the isthmus of the thyroid gland which follows the line of least resistance into the chest, being carried along and aided in its descent by the up and down movement of swallowing, by the fascial planes, and by the bony and muscular restrictions to outward extension. The chest, sternum, and vertebral column tend to converge at the thoracic aperture, and make it most difficult for nodular goiterous masses to ascend into the neck when once the thoracic cavity has been invaded. Enlargement and growth in any other than the downward course is, therefore, prevented. If the original nodule springs from the isthmus or left inferior pole of the thyroid, it is directed toward the left by the mediastinal vascular structures. Lesions from the right are, likewise, often directed toward the left by the large innominate vessels.

With the descent of the nodular growth, there is carried along the cervical and mediastinal fascia which form the capsule around the mass. The goiter is usually attached by a more or less definite pedicle to the cervical gland, but this pedicle may be very thin or even obliterated as a result of the long standing effect of swallowing, movements of the neck, and respiration. Complete absence of all former connection or of evidence of a thin pedicle is extremely rare. The blood supply is carried downward from above. The superior and inferior thyroid arteries descend with the gland as it invades the chest. The blood supply is from above downward, a point to remember at operation.

TYPE OF GOITER

The goiterous mass is usually nodular and is subject to the same pathological changes seen in cervical nodular goiter. Cyst formation, calcification, hemorrhagic degenerated areas and malignant changes occur as elsewhere. The colloid is thin and pale, and the spaces are often filled with evidences of recent or old hemorrhage. The arteries and arterioles are damaged and frequent hemorrhages occur. An extensive hemorrhage may produce sudden respiratory difficulty due to marked increases in the size of the mass. The central portion of a large goiter may liquefy due to an insufficient blood supply, and form degenerated cysts. Variable size cysts often result from hemorrhage into the tumor mass. Epithelial activity is rarely present due to poor vascularity and degenerative changes.

One of the tragedies of intrathoracic goiter is the development of malignancy. It may not be positively diagnosed except by microscopic section, but is suspected by vocal cord paralysis due to recurrent nerve involvement, restriction of the tumor mass in the up and down movement of swallowing and coughing, irregular progressive enlargement of the lesion, lung metastasis, and collection of fluid in the pleural cavity.

Constriction of the trachea may occur, necessitating the division and separation of the pretracheal muscles to afford room for outward extension of the cervical portion of the growth. Bony decompression may be necessary. Tracheotomy is difficult to perform because of the inaccessibility of the trachea below the tumor mass. Lesions totally intrathoracic expand in all directions, pushing structures aside as they enlarge.

SYMPTOMS

The symptoms are rarely the toxic manifestations as seen often in cervical nodular goiter, are largely mechanical and depend upon the structures pressed These are respiratory or vascular The trachea is usually pushed to one side and markedly narrowed from pressure resulting in dyspnea, cough, emphysema, and sometimes, when a bronchus or trachea may be markedly flattened by pressure from behind or in front Change in body posture may angulate and increase tracheal pressure causing respiratory effort A narrowed deviated trachea reduces oxygen intake resulting in increased heart effort and increased respiration, thus adding to the strain of an already *damaged thyroid heart*

Pressure sensations, a tightness in the chest, and difficulty in swallowing may not be pronounced, as very large growths seem to accommodate themselves with a minimum of discomfort Pressure upon the large vessels, especially the internal jugular veins may produce marked enlargement of the veins of the chest and neck with a great amount of swelling *of soft tissues from back pressure and* increased venous tension Sudden release of this pressure may result in severe and sudden alteration of the venous pressure of the brain Lahey has suggested that it is wise in severe cases to divide the pretracheal muscles and at times disarticulate the manubral clavicular joint to afford gradual release of intracranial pressure sometimes before removing *the mass*

The diagnosis is made by the analysis of the symptoms by an obvious cervical goiter with intrathoracic projections, by the presence of any of the above physical signs and by the roentgen ray Any suspicions should be followed by a roentgenogram It is important to make lateral as well as anterior posterior roentgenograms to determine the relation of *the trachea to the goiterous mass* and position and degree of tracheal compression

SURGICAL APPROACH

The operative approach for an intrathoracic goiter is a low collar incision It is rarely necessary to enlarge the thoracic opening by any of the surgical methods upon the bony structure

It is extremely valuable to introduce a catheter into the trachea if the goiter is large and there is constriction and deviation of the trachea A large goiter extracted through a tight fitting outlet may so obstruct the trachea that serious respiratory difficulty may develop during the process of delivery

With an intratracheal catheter in place a large intrathoracic goiter may be delivered through the thoracic aperture with the minimal embarrassment to respiration The use of helium with oxygen will permit a larger amount of oxygen to be delivered through a narrow constricted trachea and materially reduce anoxemia

It must be remembered the blood supply originates from above, and passes downward into the chest with the descent of the goiterous mass Hemorrhage is controlled by first ligating the superior thyroid artery, after which a resection of the cervical thyroid from the trachea and division of the isthmus will facilitate the subsequent removal of the intrathoracic mass by accomplishing mobility of the tumorous attachment and establishing more freedom of manipulation The inferior thyroid and lateral vein are likewise, ligated as they become accessible Vascularity within the chest is limited as the mass is surrounded by the cervical and thoracic fascia which has been pushed down with the descent of the goiter

Approach to an intrathoracic growth is best *accomplished by passing the index finger from* behind along side of the mass and freeing it posteriorly laterally, working to the lowest point of the mass and lifting it out of the thorax rather than partially freeing it and attempting to draw it out by traction A considerable negative pressure is present and prevents the delivery of the goiter until air is permitted to pass between the capsule and the goiter This often markedly elevates the goiter and makes it more accessible Forceful traction may pull on adherent bands attached to the side of the goiter and increase its anterior posterior or lateral dimensions, making delivery harder or impossible Again traction on adhesions may seriously damage some adherent blood vessels, or produce an angulation or tear into a softened trachea The posterior lateral approach affords more freedom of action by entrance through the soft areolar tissue near the tracheal groove than one between the sternum and the growth.

Hemorrhage is not great, and is controlled by packing. Small spurters should be carefully picked and ligated. The cavity, though large, may almost immediately be eliminated by shifting of mediasterial structures and lung expansion. Adequate drainage should be established and maintained to prevent accumulation of serum, infection and a fatal mediastinitis. Large unobliterated cavities should be packed or well drained to prevent bleeding, oozing, and accumulation of body fluids. The recurrent nerve is usually pushed by the large goiter mass well into the groove between the trachea and the esophagus, and is rarely injured if the capsule is carefully dissected and the tumor mass gently manipulated. The recurrent nerve should be exposed.

If piece meal removal has been employed, no remnant should remain to necrose, prolong the drainage, and add to the danger of infection and mediastinitis. The removal of large cysts may be facilitated by evacuation of the contents.

Gentleness is essential throughout the operation. It lessens the possibility of hemorrhage from adhesions to deep vascular structures and reduces the possibility of tracheal compression, collapse, or perforation. After removal of the tumor, the trachea eventually returns to its normal position.

SUMMARY

The following headings have been considered in this article:

1. What constitutes an intrathoracic goiter.
2. Curtis description of classification.
3. Manner of development of intrathoracic projections and anatomical consideration of importance bearing upon surgical removal.
4. Nature of pathological changes.
5. Technical steps in the surgical removal.
6. Indications for simple drainage or packing.

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Important Anatomical Structures in Thyroidectomy

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MANY surgeons still regard a goiter as a "sort of a tumor." As a result in a thyroidectomy, they proceed in cutting and tying the vessels as they bleed without any attention to the anatomy involved, the most important of which is the blood supply. This may succeed in the hands of a skilled surgeon, but controlling the hemorrhage is very difficult and the method is not advisable in the hands of the average surgeon who performs an occasional thyroidectomy.

At the present time, the problem of mortality is of little concern no matter what method is used in a thyroidectomy. It will be the purpose of this discussion to show that the thyroid surgeon can obtain the best mortality, cosmetic, and functional results, as well as the avoidance of technical complications such as injuries to the laryngeal nerves, parathyroid bodies, and the occurrence of hemorrhage, if he follows a careful technic based on the anatomy involved in the excision of a goiter.

The surgeon must remember that the thyroid may present certain anomalies in shape and position which are of surgical importance. The pyramidal lobe, so often the source of recurrence if not removed, at times may be absent. It may be double in others. The isthmus may be missing as in the thyroid of a dog According to Stierlin, absence of one of the lateral lobes occurs once in a thousand times We recently had such a case. Thyroptosis, retrotracheal and retroesophageal position may exist Accessory glands are at times present along the course of the thyroglossal duct from the foramen caecum Lingual goiters while rare, do occur. A recent case of ours had a large goiter at the base of the tongue just over the epiglotis Excision caused marked hypothyroidism Accessory glands can occur within the trachea and within the thorax.

The surgeon must also be conscious of the fact that while the parathyroids are usually situated external to the thyroid on its posterior surface between it and the thyroid fascia, they may be found anywhere on the capsule. Occasionally, they have been found on one of the main thyroid vessels. They usually occupy one of three positions—high, medium, or low.

As the operation is begun, the surgeon must have in mind the cosmetic result. Therefore, he must place his incision in such a way that the scar will fall at a point at the junction of the neck with the sternum. This may seem trivial to the surgeon, but it is of considerable importance to the patient. Scars that postoperatively are below this level usually become wide and ugly. It must be remembered that the larger the goiter is, the higher the incision should be made. When the healing wound is slightly above the sternoclavicular joints, the skin and subcutaneous tissues are more flexible and a neater result is obtained.

As the incision is deepened, the operator must also be mindful of the possibility of air embolism. While this is a rare complication, it does occur and must be taken into consideration, particularly in dealing with a patient with severe hyperthyroidism. The veins in the anterior and posterior triangles pierce the cervical fascia obliquely. As a result, they remain open when incompletely severed. This accounts for the occasional case of air embolism in thyroidectomy and in the excision of carcinomatous glands in the posterior cervical triangle

The usual location of the thyroid incision is at the level where the anterior jugular veins pierce the superficial layer of the deep cervical fascia. At this point the veins penetrate the fascia at an oblique angle (Fig. 1). If the incision only partially bisects the veins, the veins are held open and air is sucked into the lower end. This can occur more often in a patient with hyperthyroidism because with the extremely fast pulse much air rapidly enters the heart. The contractions of this organ on a frothy blood is occasionally accompanied by sudden death.

The anatomical relationship of the thyroid

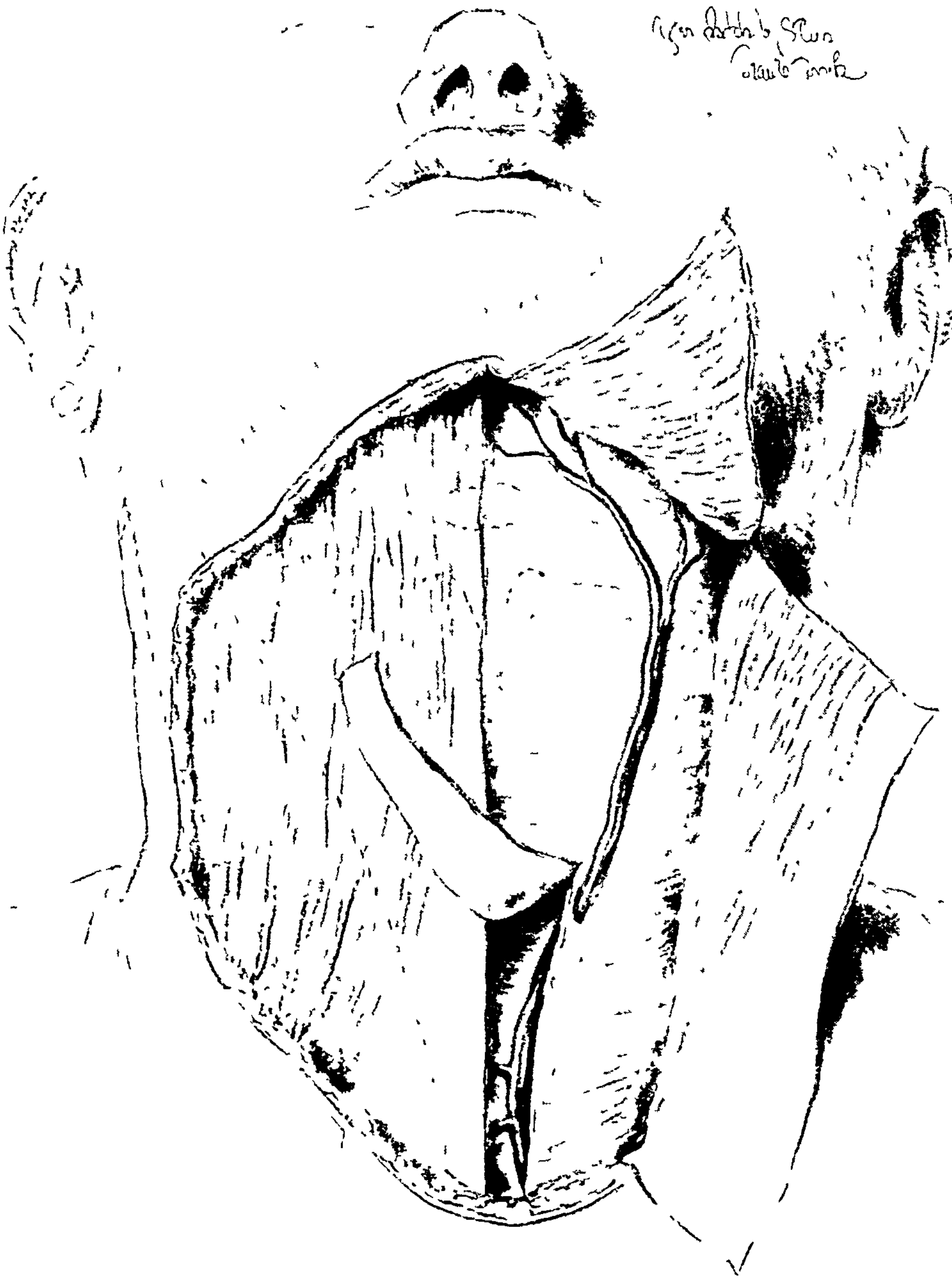

Fig. 1. Dissection showing the oblique passage of the anterior jugular vein thru the deep cervical fascia

to adjacent structures is of primary surgical importance. The most important organ in relation to the thyroid gland is the *larynx*. Immediate death from hemorrhage occurs very seldom in the modern thyroidectomy, but injury to the recurrent laryngeal nerves still occurs too often. It is one of the most disastrous complications for the patient, and a most descrediting factor to the surgeon's reputation. Injury to the laryngeal nerves can be avoided by following a technic based on an anatomical approach.

The larynx which is so intimately related to the thyroid gland, lies ventral to the fourth and fifth cervical vertebra. The normal thyroid, from 20 to 30 grams in weight, is situated over the front and sides of the upper (second to fourth) tracheal cartilages and the lateral lobes extend upward on either side of the larynx. Pathological changes in the thyroid often displace and distort the trachea and the larynx, and the surgical treatment of these disorders occasionally injures the nerves of the larynx, thereby interfering with its functions.

The musculature and innervation of the larynx are worthy of a brief review. The muscles of the larynx are divided into the extrinsic and the intrinsic groups The extrinsic group which comes from neighboring parts to be inserted on the larynx and acting on the voice box as a whole are innervated by the external branch of the superior laryngeal nerve. The intrinsic muscles confine themselves strictly to the larynx and control the functions of phonation and respiration, in which we are interested. The intrinsic muscles of the larynx are (1) the posterior crico-arytenoids, (2) the lateral crico-arytenoids, (3) the thyro-arytenoids, (4) the interarytenoid and (5) the cricothyroids. These muscles are supplied by the laryngeal branches of the vagus nerve (Fig. 2).

Respiration is brought about by the abductor muscles; and during respiration, the vocal cords are held apart. This is controlled by the paired posterior crico-arytenoids. These are the only true abductors of the cords They

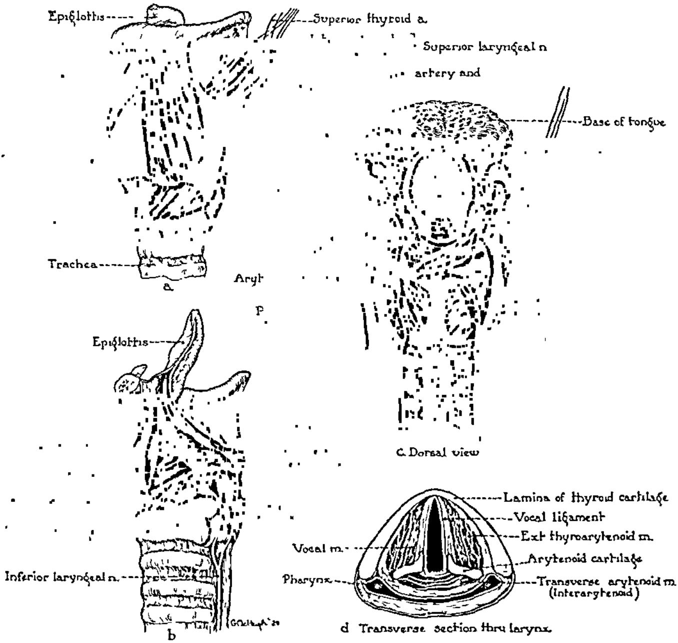

Fig. 2. Dissection of the larynx to show the intrinsic laryngeal muscles and the distribution of the laryngeal nerves (modified from Jackson). Note muscular distribution of the internal branch of the superior laryngeal nerve (permission of Surg. Gyn. & Obs).

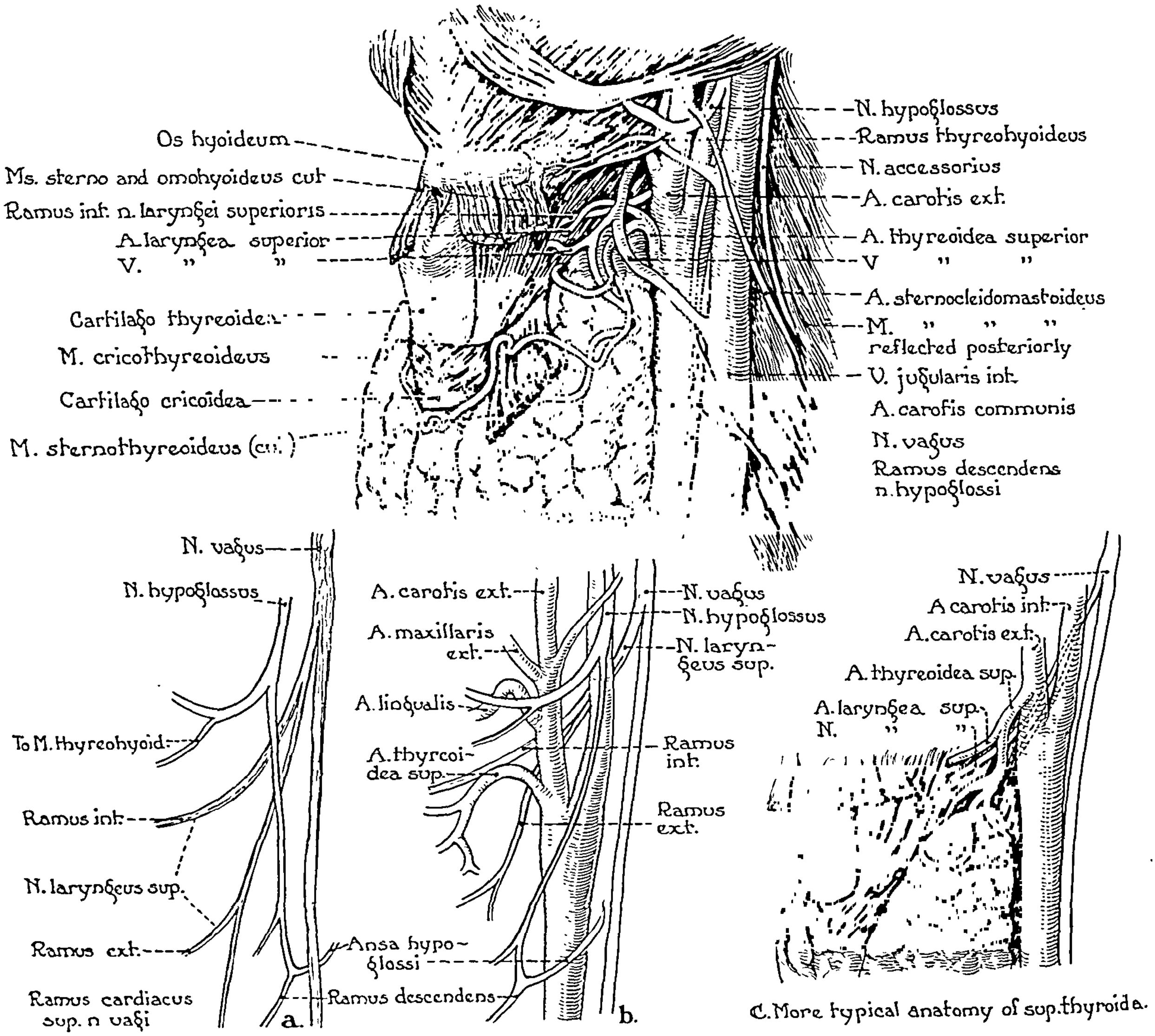

Fig. 3. Dissection to show extralaryngeal relations of the superior laryngeal nerve to the thyroid (permission of Surg. Gyn. & Obs.).

arise from the posterior surface of the cricoid lamina. The fibers (oblique and longitudinal) insert on the muscular process of the arytenoid cartilages. When these muscles contract, the vocal cords are separated.

Phonation is brought about by the adductor and constrictor muscles of the vocal cords. These muscles, when contracting approximate the cords in the midline (Fig. 2). In accomplishing this action, the lateral crico-arytenoids which antagonize the posterior crico-arytenoids, and the thyroarytenoids, which antagonize the cricothyroid, approximate the anterior one-half of the vocal cords. The posterior portions of the cords are approximated by the interarytenoid muscle. The muscle lies in the posterior aspect of the larynx and crosses the space between the arytenoid cartilages. The cricothyroid muscles (extrinsic) are composed of two distinct sets of fibers, vertical and oblique. As their name indicates, they control the change of position of the cricoid and thyroid cartilages, and when in action lengthen and tense the vocal cords. The last two muscles described are particularly important in this study because of the danger to their nerve supply (superior laryngeal).

Many studies have been made to determine the innervation of the muscles of the larynx. The internal branch of the superior laryngeal nerve is known to be sensory to the mucus membrane of the larynx. Dissections by Dilworth, New, Mullin, Berlin, Lahey and Nordland seem to demonstrate the presence of motor fibers in the nerve (Fig. 2).

From our studies of the anatomical relation of the superior laryngeal nerve, we concluded that the application of a ligature to the superior pole in a routine thyroidectomy, or in the simple preliminary polar ligation for severe hyperthyroidism, is not without danger of impairment of the functions of the larynx. The superior laryngeal nerve located a little above the outer surface of the inferior constrictor muscle of the pharynx gives off an *internal branch* which passes medially and enters the larynx through the thyroid membrane. It is mainly sensory to the larynx and supplies the interarytenoid muscle, a constrictor of the larynx by which phonation is accomplished through approximation and adduction of the vocal cords

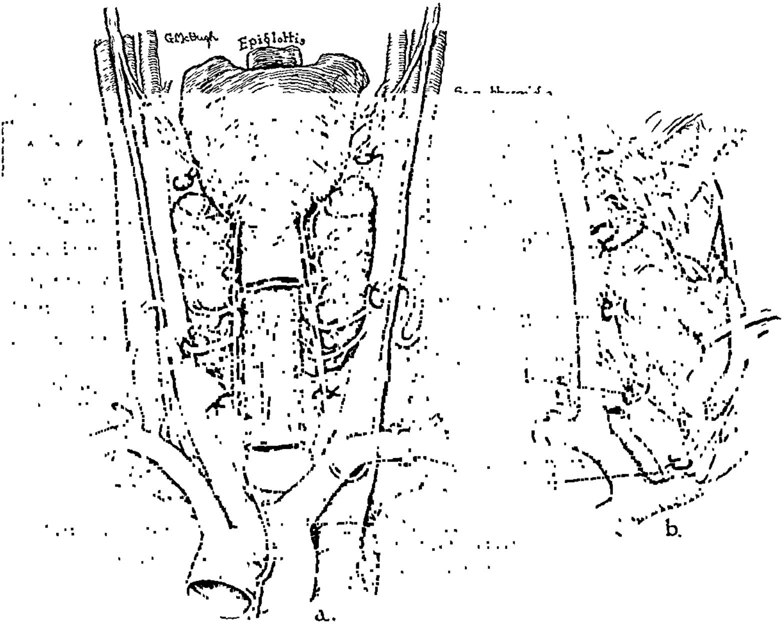

Fig. 4. Posterior view of the larynx and trachea, showing the thyroid arteries and laryngeal nerves, and the application of ligatures to the thyroid arteries to avoid the superior and recurrent laryngeal nerves (permission of Surg. Gyn & Obs.).

Whether or not the internal branch contains motor fibers, it has been demonstrated by Julian Johnson in an experimental study that injury to the superior laryngeal nerves during thyroidectomy, may be an important factor in the accumulation of postoperative tracheal mucus Furthermore, the purely motor external branch of the superior laryngeal nerve innervates the cricothyroid muscle, the interruption of which renders the voice rough, weak, and easily fatigued. For these reasons, the superior nerve must be protected (Fig. 3).

Our dissection further shows that the recurrent laryngeals arise from the vagus at different levels on the two sides—on the right as the vagus crosses the subclavian artery, and on the left as the vagus crosses the arch of the aorta. Both recurrent laryngeal nerves ascend a little lateral to the groove between the esophagus and enter the larynx at the cricothyroid articulation. A posterior view of the larynx and trachea will show the relationship of the inferior thyroid arteries and recurrent laryngeal nerves on both sides, the nerve a little farther from the tracheo-esophageal groove than usually described (Fig. 4).

Our observations clearly indicate that there are no definite differences in the relations between the inferior thyroid artery and the recurrent laryngeal nerves on the right and left sides.

As previously stated, good hemostasis is of primary importance in the surgical treatment of the diseased thyroid gland. Injury to the recurrent laryngeal nerves occurs probably most often in the attempt to apply ligatures to the branches of the thyroid arteries and in the control of hemorrhage within the capsule. The choice between the ligature of the many branches of the inferior thyroid artery intrafascially within the thyroid space, or the application of a ligature to the trunk extrafascially just after the artery emerges under the carotid sheath, should favor the latter procedure (Fig. 4). An important anatomical fact in this discussion is that the so-called external capsule of the thyroid gland is not uniformly present in the posteriomesial portion of the lower part of the gland (Fig. 5)

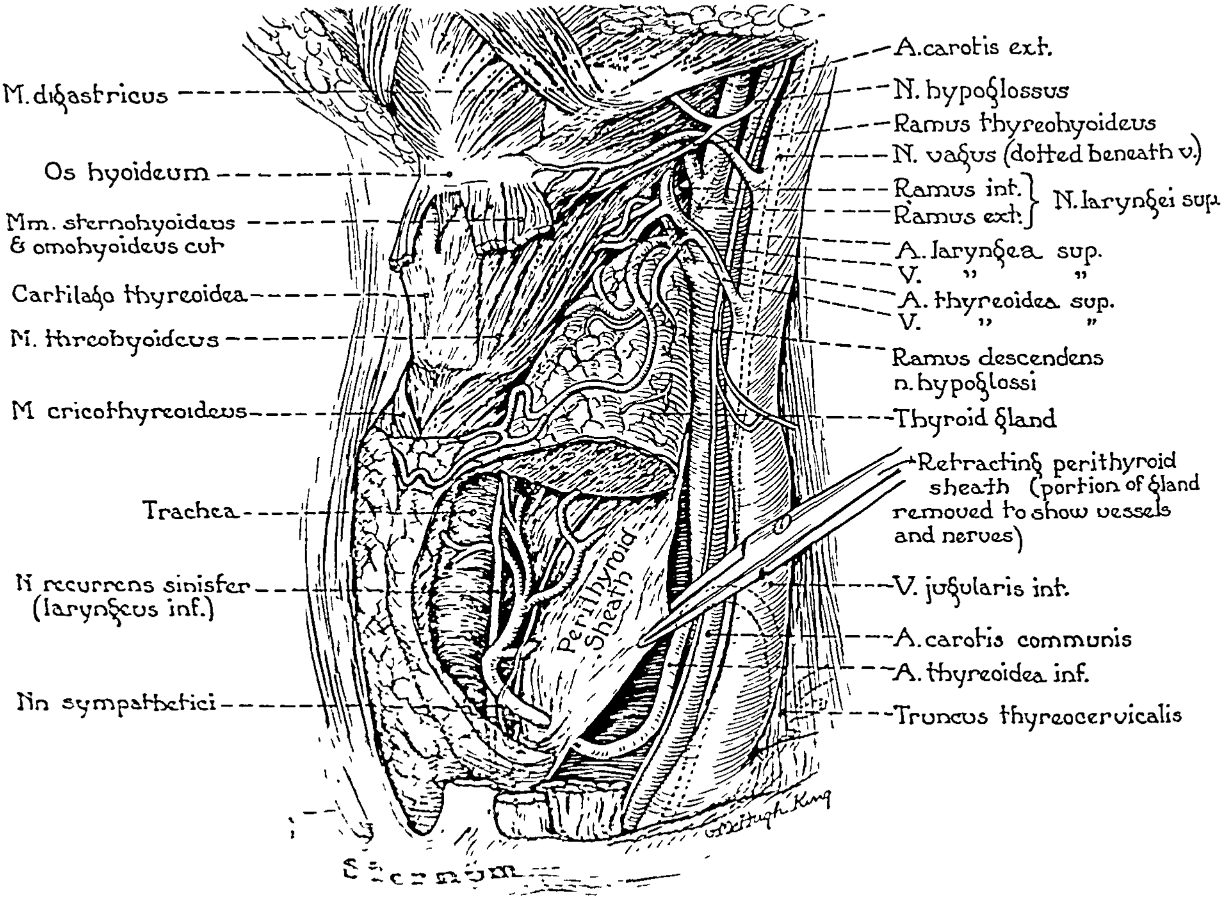

Fig. 5. Deep structures of the left side of the neck to show relations of the thyroid arteries, laryngeal nerves, and parathyroid sheath (permission of Surg. Gyn. & Obs.).

and that the recurrent laryngeal nerve is not always separated from the gland by this supposed safety zone.

The transverse section (Fig. 6) illustrates the clinical application of ligatures to the inferior thyroid artery, based on the anatomical relation. The illustration shows the usual approach to the site of the intrafascial ligation of the inferior thyroid artery, and demonstrates the danger to the recurrent laryngeal nerve *in this customary procedure. In this* method, the ligature is seldom applied to the trunk of the artery, but more often to one of its branches, not only endangering the recurrent laryngeal nerve, but also producing less hemostasis. The extrafascial approach for the ligature of the inferior thyroid artery, devised by de Quervain and adopted by us, is also indicated in this figure. In this method, the artery is tied at a point much farther from the gland, thereby, more accurately preserving the nerve and giving more complete hemostasis. The nerve is further preserved by avoidance of postoperative hemorrhage and hematoma which might press on the nerve

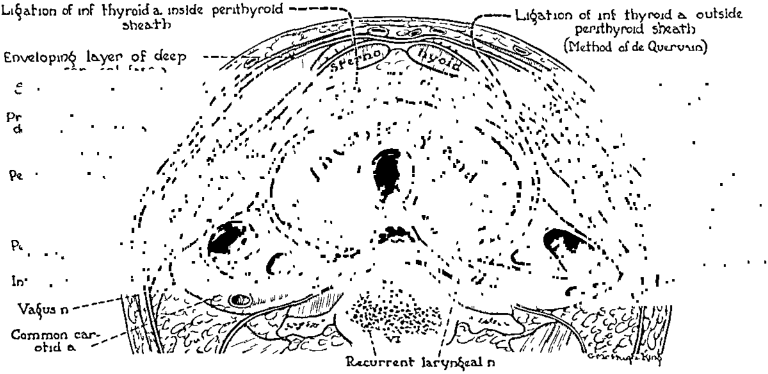
Ligation of inf thyroid a. inside perithyroid sheath
Enveloping layer of deep
Pr
Pe
In
Vagus n
Common carotid a
Stern-o-thyoid
VI
Recurrent laryngeal n
Ligation of inf thyroid a outside perithyroid sheath (Method of de Quervain)

Fig. 6. Transverse section through the neck to illustrate paths of approach to the inferior thyroid artery (permission of Surg. Gyn. & Obs).

The great justification for the application of a preliminary ligature to the inferior thyroid artery extrafascially is its simplicity. Blocking of the principle arterial supply outside of the whole venous net work of the thyroid before the veins are interfered with, results in less engorgement of the capsule and makes delivery of the gland much easier and with less bleeding.

According to Reinhoff, preoperative affections of the laryngeal nerves occur in from five to 10 percent of cases of simple and toxic goiters; whereas, in malignant goiters the *incidence is much higher. The percentage of* operative injuries to the recurrent laryngeal nerves varies from one to five percent and depends to a great extent on the type of the case and the technic employed, as previously indicated. For instance, injury to the recurrent laryngeal nerve may be sustained during the mere delivery of a substernal enlargement of the left lobe, because the left recurrent nerve curves over the arch of the aorta. In a series of cases of this type, there would probably be a much higher incidence of injury to the recurrent laryngeal nerve than in the ordinary cases.

The more care used in hemostasis, the less danger there is of paresis of the recurrents. Our dissections would indicate that the nerve would be more liable to injury by the intra-

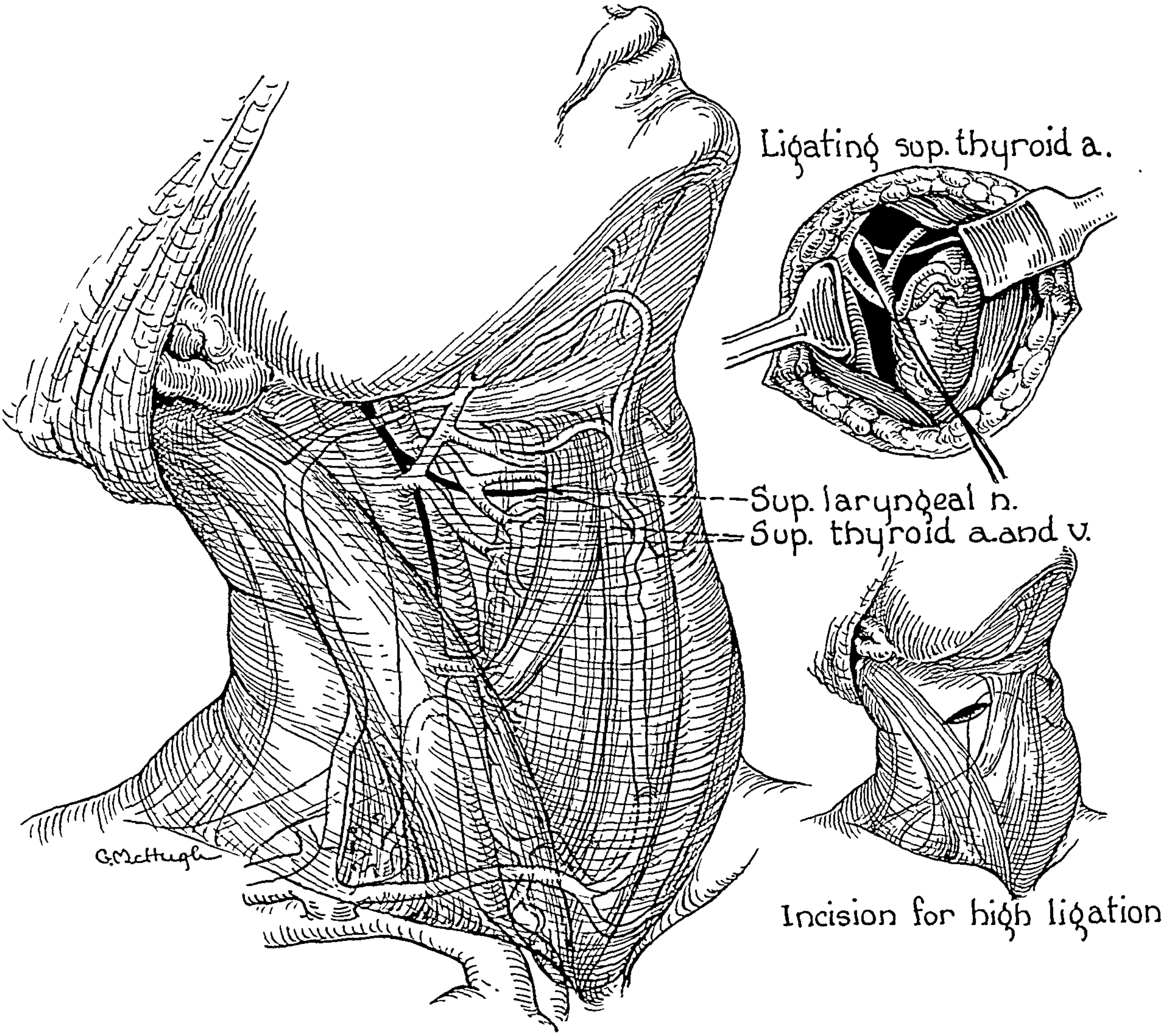

Fig. 7. *State Operation:* Ligation of superior thyroid arteries in selected cases of severy hyperthyroidism. Preliminary to subsequent thyroidectomy (permission of Surg. Gyn. & Obs.).

fascial method of ligation of the artery. According to de Quervain, injuries to the laryngeal nerves are more frequent in thyroid surgery when the gland has been previously operated upon.

Judd states that recovery of the voice usually occurs following injuries to the laryngeal nerves and dyspnea also disappears because the normally functioning cord overcompensates and approximates the affected one. Thus, the voice is restored, but usually in a lower pitch. It is probable that the percentage of injuries to the laryngeal nerves following surgery of the thyroid gland is higher than statistics show. Unless routine laryngoscopic examinations are made before and after operative procedure, one cannot be certain of the state of the function of the vocal cords. Such examinations should not be omitted.

There is a tendency to assume that with the advent of the preoperative employment of the anti-thyroid drugs, such as thiouracil, propyl thiouracil and lugols solution, that preliminary polar ligations are no longer necessary. There is no doubt but that the employment of these drugs in the preparation of patients with hyperthyroidism for operation has lessened the need for stage operations. In spite of this, there remains a place for this operation. It has previously been shown that

fondeé sur des connaissances d'anatomie exactes est suivie de moins de complications. Pour contrôler l'hémorragie, l'application préliminaire de ligature sur les principaux vaisseaux artériels, nous dispense de l'emploi de nombreux forceps. Nou savons que ces forceps mettent em danger les nerfs laryngés. Pour la même raison, on emploi moins de ligatures. Il en résulte moins de drainage et une convalescence plus rapide et une guérison permanente plus probable.

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Thyroid Anesthesia

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THYROID surgery can be, and too often is a treacherous affair It thus behooves the goiter surgeon to use every device at his command to make the operation less dangerous to the patient and easier on the operator There have been many safety factors introduced since Plummer[1] first used iodine in toxic goiter There have been the multiple stage operations, Crile's[2] anociation technic, Lahey's[3] dissection of the recurrent laryngeal nerves, Astwood's[4] introduction of the antithyroid drugs, and many others In attempting to make the act of thyroidectomy easier and safer, the problem of anesthesia should be carefully studied We wish to review the different aspects of anesthesias now in common use and will try to determine which one is preferable

Let us first consider what is the *perfect* anesthesia Heard,[5] Cole[6] and others have various requirements for the perfect thyroid anesthesia Combining their ideas with some of ours, the perfect thyroid anesthesia should afford goiter patients these certain safeguards

1 It should be pleasant to take and not heighten nervous tension and therefore should be rapidly induced

2 It should depress metabolism and not stimulate the gland

3 It should not elevate the blood pressure and heart rate, nor cause anoxemia, nor damage the myocardium

4 It should not increase bleeding

5 It should not cause laryngospasm and should provide good relaxation for the removal of even large glands, yet maintain normal respiration

6 It should be non irritating to the bronchial tree and should not cause excessive secretion of mucus

7 It should be followed by a postoperative period of rest without vomiting or acidosis

8 It should have a wide margin of safety and conserve the patient's energy

9 It should make the surgeon's task easier and the patient's ordeal safer

Needless to say, the perfectness of an anesthesia does not lie in the drug alone, but that a great deal lies in the skill and artistery with which it is administered In this article we hope that we can see the different anesthesias in an unbiased manner, and that we may be able to judge each—pro and con We will attempt to omit reference to the skill of the anesthetist, in each instance only bringing out those factors which directly affect the patient and the surgeon

LOCAL INFILTRATION

This is the old standby A few years ago local infiltration was used by almost every thyroid surgeon and today many still use it The original cocaine infiltration has now been replaced by less toxic agents such as novacaine, intracaine and many similar products The patient's earnest request "I don't have to go to sleep, do I Doctor?" promotes its usage Some surgeons favor it for it demands gentle treatment of the tissues The patient's speaking voice can be heard and they know when they have injured the recurrent laryngeal nerve

The newer injectables have little toxicity both locally and to the body It is admitted by those who use local that toxic patients are nervous, excitable and thus react poorly to the conscious state during operation under local anesthesia This calls for heavy and accurate premedication which practically amounts to anesthesia

In many instances the anesthesia is not adequate, especially when the lateral lobes are elevated Thus Lahey[3] has pointed out that the surgery is definitely restricted due to a lack of proper manipulation and exposure There is no other factor as responsible for poor surgical results as a lack of proper exposure In attempting to deaden these pain pathways so that more exposure may be obtained, too often one finds that the minute anatomy is obliterated by the edematous tissue Without accurate visualization of the anatomy, serious and irreparable damage may occur.

The ever constant fear of paining the patient, of upsetting the patient, of not being allowed to manipulate as you desire add tremendously to the strain of the operator and his assistants. If strain and anxiety do shorten life, then the patient and surgeon have both lost time the day of the local thyroidectomy. Zellhoefer[8] has shown that local infiltration slows the healing of thyroidectomy incisions.

In order to retain the favorable aspects of local anesthesia some operators have used a light inhalation or rectal anesthesia to aid the local in allaying the patient's fears. These have been near perfect, yet the local may still obliterate the anatomy. The inhalation anesthesia still has its same effects, as will be discussed later.

BLOCK ANESTHESIA

This has essentially the same qualifications and difficulties as local except that the anatomy is not distorted. Most block anesthesias use adrenalin or some epinephrine like substance in the solution to prolong its effect. These are definitely contraindicated in goiter surgery.

NITROUS OXIDE

This inert gas makes a fine short inhalation anesthesia and is highly praised. The biggest, and most important objection to nitrous oxide is the anoxemia which develops when the gas is pushed far enough to get good results. Sise[9] has shown that a toxic patient who has marked, or even some, myocardial damage cannot tolerate even slight anoxemia. Barach[10] has shown how important oxygen is to the ailing heart. In all anesthetic machines there is a certain amount of rebreathing, and unless the carbon dioxide is removed adequately there will be an accumulation of carbon dioxide whose stimulating effects should be avoided.

There is considerable psychic trauma resulting from the smothering sensation experienced by the thyrotoxic patient when the mask is in place on the face. Crile's anociation method of "stealing" thyroids is letting the patient breathe oxygen several mornings as if he were doing a B.M.R., then on the chosen morning he substitutes nitrous oxide oxygen mixture. This apparently limits many patient's anxiety. Recently, however, one of us asked our anesthetist to let us smell, through the same mask, pure oxygen and nitrous oxide oxygen mixture without informing us which was which. We could tell every time when the nitrous oxide was introduced and we believe that the easily excitable, nervous, supersensitive thyrotoxic patient could also detect the difference. Nitrous oxide is a weak anesthetic and laryngospasm will often occur if the anesthesia is too light. If it is too deep, then anoxemia will occur.

ETHYLENE

This gas has not found the wide use that nitrous oxide has been awarded, yet in many ways it is not unlike nitrous oxide in its advantages as well as its disadvantages. More oxygen can be used with ethylene, but it makes an explosive mixture which contraindicates the use of the electric cautery, which has proved so useful in obtaining "bone dry" thyroidectomies.

CYCLOPROPANE

Cyclopropane has many faithful followers. It has low toxicity, adequate oxygen can be used and the reaction time is rapid. Yet Lahey,[3] who uses it exclusively, states that if the concentration is a little high, cardiac irregularities are often noted, especially in the thyrotoxic individuals. This may be followed by ventricular fibrillation with sudden death.

In the toxic patient the margin of safety is quite narrow. Cyclopropane causes an increased capillary blood flow[11] with a resultant increased bleeding at the time of operation. The thyrotoxic patient needs all the oxygen carrying blood it has to help keep the load on the overburdened heart at a minimum. Cyclopropane irritates the bronchial tree to a certain extent, which should be avoided. There is an increased amount of nausea[12] and vomiting following cyclopropane which, if it occurs, may lead to several undesirable conditions such as secondary hemorrhage, change in blood chemistry, etc. Everyone is familiar with the highly explosive nature of cyclopropane and the many precautions one must take. This certainly prohibits the use of the electric cautery, which many thyroid surgeons are now finding so indispensable.

ETHER

Ether has always had the reputation of being the *safe* anesthesia, but not in the surgery of the thyrotoxic patient It stimulates the diseased gland[illegible] and thus raises the B M R It irritates the bronchial tree causes an increase in the alveolar moisture which hinders the free exchange of oxygen going into the blood stream and carbon dioxide escaping as easily and quickly as if the mucous membrane were not flooded

Ether is usually followed by nausea vomiting and sweating which increases the dehydration and changes the body chemistry The vomiting and gagging tends to cause post operative bleeding in the neck Ether increases intracranial pressure which will in turn cause increased blood pressure and increased bleeding Ether is certainly objectionable and unpleasant from the patient's viewpoint

AVERTIN

Avertin is a basal type of rectal anesthesia, which is given the patient as an enema, thus it doesn't excite the patient and abolishes psychic trauma It decreases the B M R and causes a decrease in the rise of the blood pressure during the operation These things speak in favor of its use, but as Cole[6] has pointed out, the disadvantages outweigh the advantages It depresses respiration and encourages cyanosis It increases the pulse rate,[13] which is already too high More postoperative care is required and it occasionally causes nausea It reduces the operability of the toxic patient and anesthetic deaths are more frequent than with any other agent[6]

PENTOTHAL OXYGEN CURARE

We have discussed the usual thyroid anesthesias except pentothal oxygen curare and before we discuss the pros and cons of this anesthetic let us pause to review what it is and our manner of giving such an anesthesia, for as we said previously there is considerable more to an anesthesia than the drug itself

Pentothal sodium[14] is a short acting barbiturate which is not a pain relieving agent but acts as a sleep inducer, and thus its action is upon the central nervous system Apparently the brain is the first to be affected, the spinal column next and the medulla oblongata last The rapid action of pentothal sodium is due to the fact that it reaches the nervous system directly from the blood stream before it can be destroyed or eliminated The exact location of the disposition of pentothal sodium after injection into the body has not been definitely determined but apparently it is not in the liver as has been supposed in the past[16] In large doses pentothal depresses the respiratory and vasomotor centers in the medulla oblongata It is believed that anoxemia if occurring, is due to decreased oxygen supply to the lungs and not due to the peripheral action of the drug It is with this in mind that we advocate the continuous use of oxygen and we have thus come to call it pentothal oxygen curare anesthesia

Curare is not an anesthetic agent[15] Its main action is muscular relaxation by interrupting the efferent impulses at the myoneural junction, probably by neutralizing the action of acetylcholine[16]

Curare is a mixture of the watery extracts of a number of plants of the strychnos species Its activity is due to crystalline d tubocurarine chloride There are several types of curare The one obtained from condrodendron tomentosum and known as d tubocurarine chloride affects the various muscles of the body in the following order[16] First it affects those innervated by the cranial nerves then those of the trunk and extremities Thirdly those of respiration and finally those of the diaphragm Thus optimum results are obtained if the curare in the body can be maintained at such a level as to affect the muscles of the trunk and extremities and not the muscles of respiration

Sollmann[1] discusses another type of curare and reports the various groups of muscles affected quite differently He fails to differentiate the different types of curare and explain them, causing comment until such is understood The smooth muscles of the vascular system are not affected nor does the rate, rhythm, PR QRS or the QT interval amplitude or configuration of the individual complexes of the electrocardiogram[18, 19] show any variation

Harris reports that no change, which at present could be considered abnormal, was observed in the electroencephalogram when curare was administered.

The contraindications to the use of curare are myasthenia gravis and the inability of the anesthetist to perform artificial respiration, which can be easily accomplished with a clear airway and the inhalation bag from any good anesthetic machine.

It is believed from laboratory experiments that curare is broken down or eliminated in about 20 minutes. This rapidity of elimination is the greatest safety factor[21] in using curare. This time element apparently is lengthened in the premedicated or anesthetized patient or in the patient receiving large or multiple doses of curare.

Fig. 1.

Our patients receive one and one half grains nembutal the night before operation and again two hours preoperatively, then one hundred (100 mg.) milligrams of demerol and one one-hundred and fiftieth grains (1 150 gr.) of atrophine one hour preoperatively. We use[22] the *Rudder pentothal syringe holder* to facilitate the giving of this type of anesthesia. It clamps on the arm board and holds the 50 cc. syringe, which is filled with two and one half percent pentothal sodium solution in sterile distilled water (Fig. 1). This can be injected through the short length of rubber tubing and needle into a vein (the usual one lying in the antecubital fossa) by turning the knurled knobs on either side, which pushes the plunger slowly down. We usually affix a three way stopcock between the syringe and the injection needle so that a clysis may be administered through the same needle.

The patient is placed in the supine position on the operating table with the head slightly elevated. A small sandbag or rolled-up sheet is placed under the shoulders so that the neck is hyperextended, yet comfortable for the patient (this reduces the amount of neckache following thyroidectomies). The arm is placed on the arm board and the needle introduced into the vein. This procedure is done as speedily as possible, yet without flurry so as not to excite the patient. Next the pentothal solution is slowly injected and usually within 20 *to 30 seconds, a minute at the most, the patient* is quietly, calmly asleep. There has been no period of excitation. The oxygen mask is placed over the face and the oxygen begun. It is strongly felt that the oxygen should be started as soon as the patient has lost consciousness. More pentothal is given until the eyelid reflex is abolished. Now it is time for the neck to be prepared and draped. When this is done the patient is ready for the operation.

The anesthetist probably should now insert a metal airway to insure an adequate respiratory exchange. After placing the airway, careful attention should be made to the sound of respiration, for normal breathing has a definite character and with experience one can immediately notice a stridor which[11] would occur if one of the vocal cords were to change due to injury to the recurrent laryngeal branch of the vagus nerve. The anesthetist can then tell the operator of such change and he can at least try to find the damaged area and try to relieve the trouble.

About the time that the prethyroid muscles are being separated the anesthetist should inject 40 to 60 units of curare into the intravenous needle and allow it to be all flushed in by the clysis, which is reconnected. The acid d-tubocurarine chloride precipitates the basic pentothal if they are mixed. This precipitated pentothalic acid is quite soluble in the blood stream or in an excess of pentothal.[23] It will do no harm, but its injection into the vascular system is not desirable.

The respiratory rate is maintained between 16 and 20 for the usual patient. If the rate becomes more rapid it usually means that the anesthetic is too light and more pentothal is needed The relaxation of the masseter muscles shows whether the neck muscles are relaxed Using this guide more curare can be given if necessary, usually more is not needed In the rare instance when a patient is not deep enough and the surgeon tugs a little too enthusiastically on the thyroid the patient begins to have a little laryngeal spasm, the anesthetist should immediately give more pentothal and curare to relax this spasm If these signs are ignored,[11] laryngospasm will occur, just as in any other anesthesia when it is too light If the laryngospasm goes ahead and fully develops the curare still will relax it After such an occurrence it may be necessary to hand breathe the patient with the bag of the gas machine for a few minutes to guarantee that all anoxemia be overcome In our practice this has been a very rare occurrence

With a little experience the anesthetist knows when and when not to give more drug Our patients are usually lightly asleep when put back to bed Before we started to use propylthiouracil in the preoperative treatment of toxic goiters it was occasionally necessary to "steal" a goiter This was accomplished by having the anesthetist give the patient a gram of sodium iodide in a blue 50 cc syringe intravenously each day for several days then on the morning of operation substitute pentothal for the sodium iodide solution The blue syringe camouflaged the slightly yellow pentothal solution so that the patient actually did not realize the change until she was back in her bed with her goiter out Long and Oschner[24] and also Krump[25] have shown that the pulse rate at the end of operation under pentothal is much slower than any other anesthesia This also has been our experience

Thyrotoxic patients do have decreased liver reserve and it was supposed that pentothal might affect the liver, but Kohn and Apper[26] have shown that the liver is not the site of pentothal destruction We have given this anesthetic to patients showing marked liver insufficiency with no demonstrable deleterious effects

According to the previously stated qualifications of a perfect thyroid anesthesia let us grade pentothal oxygen curare Pentothal oxygen curare anesthesia is safe for thyroid surgery as well as for other types of operations as testified by our having no anesthetic deaths in over 4000 cases at the Georgia Baptist hospital, Atlanta It is pleasant to take, and our patients don't mind having it again should the necessity arise Pentothal is a sleep inducer, doesn't heighten nervous tension and the calm, quiet induction period is less than 60 seconds long Pentothal depresses the metabolic rate and does not stimulate the normal or diseased thyroid gland It does not change the blood pressure or heart rate, nor does it affect the myocardium as far as can be detected by electrocardiogram Although pentothal in large doses does affect the medulla oblongata and its respiratory centers, if properly given, and especially if oxygen is given continuously, anoxemia does not occur Pentothal does not increase bleeding Pentothal and curare will relax laryngospasm already in progress (curare's only action is relaxation) It is not irritating to the bronchial tree and will not cause secretion of mucus into the alveoli It is not followed by nausea and vomiting, but rather is followed by a drowsy feeling which sedates the anxious patient and conserves his energy

There have been various criticisms of pentothal oxygen curare, but we have found them invariably due to a lack of information by the person making accusation or that he had experienced some bad results before he had learned to use this combination With pentothal alone, however, some of these claims may have been justified because of the large dose required to bring about relaxation and freedom from laryngospasm and some anoxemia may have been produced However, we feel that if our technic is followed no trouble should arise

SUMMARY

1 The requirements for the *perfect* anesthesia for thyroidectomy have been suggested and the usual anesthesias now in use have been judged accordingly

2 A detailed report has been made on pentothal oxygen curare and it has been illustrated how near this type of anesthesia approximates the *perfect* anesthesia for thyroid surgery

3 The great safety of pentothal oxygen

curare has been shown in that there have been no anesthetic deaths in over 4000 cases.

4. The method of administration of pentothal oxygen curare described is greatly simplified, thus offering better control and greater safety.

RIASSUNTO

Un'anestesia veramente perfetta per la chirurgia tiroidea dovrebbe rispondere ai seguenti requisiti: essere rapida e nello stesso tempo gradevole al paziente, così da non elevarne la tensione nervosa; deprimere il ricambio basale; non aumentare la pressione del sangue e la frequenza del polso; non provocare un'anossiemia; non danneggiare il miocardio; non favorire la tendenza alle emorragie; non provocare un laringospasmo, così da conservare una respirazione normale anche allorquando si debba asportare una ghiandola molto voluminosa; non provocare un'irritazione dei bronchi ed un'eccessiva secrezione di muco; essere seguita da un periodo di riposo, senza vomito ed acidosi; avere un ampio margine di sicurezza per l'ammalato. L'A. ritiene che la combinazione di pentotal-ossigeno—curare consenta un'anestesia quasi perfetta, poiche' mentre riduce ad un minimo i rischi per il paziente, rende piu' facile il compito del chirurgo.

SUMARIO

La anestesia perfecta en la cirujia del tiroides debe de poseer lo siguiente: Debe de ser agradable y por lotanto no debe de aumentar la tension nerviosa del paciente. Debe de tener una influencia inhibitora sobre el metabolismo en general y por lo tanto no ser capaz de estimular la grandula tiroides; Debe de ser libre de efectos hipertensivos y cardio aceleradores y al mismo tiempo no favorecer la anoxemia. o la hemorragia. No debe de producir el espasmo laringeo y debe de permitir buena relajacion. sin interferir con la respiracion normal del paciente. particularmente en los casos de tamano exesivo de la glandula. Debe de ser libre de toda accion irritante del aparato respiratoria y no favorecer la secrecion bronquial. Debe de favorecer un periodo post-operatorio libre de nausea y de acidosis, debe de ser libre de todo peligro y al mismo tiempo capaz de conservar la energia del paciente; en una palabra, debe de ser capaz de facilitar el trabajo del circujano y minimizar el sufrimiento del paciente. El autor reporta el uso de la anestesia por el pentotal con oxigeno y curare y demuestra como este metodo es casi el metodo ideal de anestesia en la cirujia de la glandula tiroidea.

SOMMAIRE

Le critĕre, qui nous permet d'envisager l'anesthésique parfait pour les opérations sur la glande thyroïde, est le suivant:

Il faut que l'anesthésique soit agréable á prendre et qu'il n'augmente pas la tension nerveuse; par conséquent il faut qu'il individu l'anesthésie rapidement; il ne doit pas élever le métabolisme basal et ne doit pas stimuler la glande; il ne doit pas élever la pression artérielle et le train du coeur; il ne doit pas déterminer l'anoxémie ni endommager le mycocardium; il ne doit pas provoquer le laryngospasme et doit procurer un bon relâchement permettant l'extirpation même de larges glandes tout en maintenant une respiration normale; il ne doit pas irriter les muqueuses bronchiales et ne doit pas provoquer une sécrétion excessive de ces derniéres; il doit être suivi par une période postopératoire de repos sans vomissements et sans acidose; il doit faciliter la tâche du chirurgien et alléger l'épreuve du malade. L'auteur rapporte l'emploi de penthotale oxygéne curare et affirme que c'est l'agent qui approche le plus de l'anesthésique parfait pour la chirurgie de la glande thyroïde.

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Progress in Dealing with Vocal Cord Paralyses

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SINCE the first aseptic operation for the relief of obstructive dyspnea due to bilateral vocal cord paralysis which was performed in July 1938, considerable progress has been made, numerous modifications of technic have been devised, a broadened interest in the subject both by general surgeons and laryngologists has developed, and the larynx has been given a place of increasing importance in the human economy.

The results from reconstruction of the paralyzed larynx have been dramatic and in most cases, gratifying to the afflicted. With the great increase in the number of surgeons performing operations for goiter, there has occurred a corresponding increase in the number of paralyzed recurrent nerves. The need at present is for a better understanding of the anatomy of the larynx and the recurrent nerves, particularly of the relationships of those nerves to the thyroid gland, the inferior thyroid arteries and the branches of those arteries. There is also a need for better teaching of the anatomy as well as training in a technic which will reduce the number of such injuries.

The prime objectives of all operations for the relief of bilateral vocal paralyses are to secure an adequate airway and a usable voice. In general, all of the several methods employed can be grouped under one of two headings.

1. The outward displaceme[illegible] and fixation
the arytenoid cartilage ar[illegible] l band
[illegible] is the method I devised [illegible] used
[illegible] clusively.
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cutting a small window in the ala of the thyroid cartilage on a level with the arytenoid. He then passes a small hook around the arytenoid cartilage and extracts it through the window. The vocal cord is then sutured to the muscles and fascia overlying the ala of the thyroid cartilage.

DeGraaf Woodman has modified the Kelly technic. He approaches the arytenoid from the rear by dividing the fibres of the inferior constrictor muscle and then separating the mucosa of the hypopharynx from the thyroid cartilage and a portion of the cricoid. This exposes the arytenoid which is removed. The vocal cord is then displaced outward by suture, accomplishing the same purpose as the Kelly operation. Others, including H. B. Orton, have made slight modifications of the Kelly and Woodman technics. More recently Wm. C. Thornell (Cincinnati) has removed the arytenoid by a direct vision laryngoscopic technic.

It is not my purpose to discuss the merits of the various technics. Perhaps it is best for those interested in performing the operations to concentrate on one technic and strive to perfect it.

As stated earlier, I have used the method of displacing the arytenoid outward and fixing it to the thyroid cartilage in a state of outward rotation. This technic will be described later.

The original operation was devised with, or upon the idea of a substitution of muscle function. The omohyoid was divided and attached to the arytenoid cartilage for the purpose of replacing the paralyzed cricoarytenoideus posticus. The cricoarytenoid joint develops a state simulating ankylosis in cases of bilateral cord paralysis. It was found necessary to divide the posticus and interarytenoideus muscles and disarticulate the arytenoid cartilage as well as fix it in outward displacement. Time nd experience proved that it was the outward splacement and fixation which secured the ults and not the transposed omohyoid.

f an adequate airway can be secured, and it lly can, by operating on one cord, it produces a much more satisfactory result than is secured by operating on both sides The reason is that the vocal band of the unoperated cord is in the phonation position and in better condition and position for the production of sound than is the displaced vocal band If an adequate airway is not secured by the unilateral operation, it becomes necessary to operate on both cords

One might conclude that it would be possible to obtain an equal degree of displacement in all individuals, but such is not the case. The width of the pyriform fossae in some individuals is greater by from 3 to 5 mm than in others It is wider in men than in women, just as the larynx is larger in men. This difference is somewhat nullified because the arytenoid cartilage is larger in men.

The best results, as far as the combined functions of voice and airway are concerned, result when an opening of from 4 to 5 mm. between the vocal processes is secured. An opening of less than three mm. produces a good voice but inadequate airway An opening of more than six mm produces an excellent airway, but only a whisper for a voice. It is, therefore, important to set the opening as near 4 to 5 mm. as possible.

On a few occasions with a unilateral operation, I have secured an opening too wide Within a few days after the operation, despite the swelling and edema in the larynx, it was apparent that these patients had secured excellent airways, but were only going to have a whisper for a voice. In three such cases, I went back and opened the wounds, cut the sutures displacing the arytenoid cartilages and placed a small piece of muscle between the arytenoid and thyroid cartilages, thus lessening the displacement with consequent narrowing of the airway. In all three, there resulted a quick and marked improvement of voice as well as an adequate airway.

The most recent advance in surgery of vocal cord paralyses is reported by Lewis F. Morrison *Annals of Otol Rhinol. and Laryngol.* Dec. 1948, under the title of "The 'Reverse King Operation'."

This operation was performed for the purpose of restoring the voice in a man who had a unilateral cord paralysis in extreme abduction with aphonia. In his case, as sometimes happens, the unparalyzed cord was unable to develop compensation and cross the midline of the larynx to appose the paralyzed and displaced cord, creating air waste with practically no voice.

Much of the technic employed is similar to that for bilateral cord paralysis with both cords in the midline, except in the original operation the posticus muscle is cut away from the muscular process of the arytenoid, the cricoarytenoid joint disarticulated by complete division of the joint capsule, the cricoarytenoideus lateralis fibres cut and the arytenoid cartilage vocal band displaced and fixed outward. The reverse operation does just what the title indicates It displaces the arytenoid mesially and fixes it on the midline of the posterior rim of the cricoid cartilage, thus displacing the vocal band to the midline so that the unparalyzed cord can appose it during phonation efforts The complete technic is accurately described by Morrison. His case develoed a practically normal voice in a very short time.

I have performed the operation twice but with less success than was secured in Morrison's case In both instances catgut was used to fix the arytenoid in position. This was a mistake. Following its absorption, the vocal band shifted outward, diminishing the strength of the voice in each case.

From the foregoing comments, it may properly be deducted that the reconstruction of the paralyzed larynx consists in placing and fixing one cord in the position of most efficacious usefulness, in regard to both airway and voice, bearing in mind that there must be a compromise between airway and voice. Only in the event of failure to secure an adequate airway and usable voice should both cords be operated upon.

I have found that the same principles may successfully be applied to a few other pathologic states in the larynx, not the result of recurrent nerve paralyses.

1. Bilateral ankylosis of the arytenoid cartilages with both vocal cords fixed in the midline.
2. Certain traumatic injuries to the larynx resulting in a fixed midline position of both vocal cords.

In the very few cases of bilateral ankylosis

right vocal cord had returned to almost normal excursion and he possessed a good voice When last seen, undaunted, he was again heading for trouble.

To date, I have operated on 108 patients for bilateral cord paralysis, two for unilateral paralysis in extreme abduction with aphonia, one for bilateral ankylosis of the arytenoids with the vocal bands fixed in the midline and one for a gunshot wound with a similar type of obstruction. It hardly seems desirable to make a complete classification of the results. It may be said that all but two could converse over the phone. The tracheal cannula has been removed in all except two, one of whom could comfortably go with the cannula plugged, but on account of fear refused to have the cannula removed. The other patient could undoubtedly be relieved of the cannula by operating on the other cord. Two of the patients have taught or are teaching school; one is the secretary in a physician's office; two are trained nurses and a number of others are gainfully employed

Lewis Morrison of San Francisco has successfully operated on 47 cases Pemberton of the Mayo Clinic, when last seen, had operated on more than 30 cases Hollinger of Chicago, Richard Mahon of Dallas, and numerous others have also had successful results with arytenoid displacement and fixation.

The following description of technic is, at present, routinely used and has been used for the last five years. Personally the technic herein described has proved more successful than was obtained in my early experiences with the operation when the omohyoid muscle was considered a factor of importance in securing an adequate airway. We no longer believe the omohyoid transposition to be of importance. This technic, except for minor alterations, was recently reported by Chevalier Jackson and Chevalier L Jackson.[8]

IMPROVED TECHNIC IN THE KING OPERATION FOR RELIEF OF BILATERAL VOCAL CORD PARALYSIS

Experience has shown that the results obtained in the operation for the relief of bilateral abductor cord paralysis were not always the same when the original technic was used.[1] By a modification of that technic, described in "Diseases and Injuries of the Larynx," by Chevalier Jackson and Chevalier L. Jackson, an adequate airway was secured in a higher percentage of cases Inequalities of voice have occurred following operation by either technic. Failure in securing a voice and airway of uniform standard is thought to be due more to inherent differences with which the surgeon is dealing than to alterations of technic. Human larynges vary in size and shape almost as much as human noses

In the majority of patients, an adequate airway and a good voice were obtained. Considerable variation has occurred in the 108 patients studied after operation The differences in voice range from an actual improvement in two instances to only a whisper in two Most have some huskiness of voice.

As for airway, it may be said that an opening between the cords of less than three mm. produces an inadequate airway and one of more than five mm. will produce a poor voice although an excellent air supply. Patients learn automatically to vary and improve the airway but this is controllable only to a limited degree.

It can be stated with certainty that, following a bilateral operation for relief of paralysis of the vocal cords, the average voice will be less satisfactory than when operation is performed on one cord only. It is believed that most of the sound produced in the larynx following the operation is the result of vibrations of the undisturbed cord. Therefore the vibratory function must be preserved.

Contractures of the paralyzed vocal cords are not always of the same degree. Vocal cords vary considerably in length. The length of the cord in the male averages one and one-half times that of the cord in the female. It is easier to secure a good airway when dealing with a long cord. The larynx in the male is much larger than that in the female. The pyriform fossae of the larynx are wider in the male than those in the female. Therefore, during the operation a greater outward displacement of the arytenoid cartilage is possible in the male than in the female. Also, the width of the fossae may vary considerably in individual members of the same sex. All factors must be considered in the course of an operation. Unless one has thoroughly studied the larynges of both sexes, it is [illegible] the necessary calculations.

paralysis of the vocal cords About 25 percent of the patients had been tracheotomized from one to 24 years In former articles it was stated that preliminary tracheotomy should always precede laryngoplasty and muscle transportation For the past five years or more, when the patient had not previously had a tracheotomy, I have routinely performed a tracheotomy and laryngoplasty at one sitting The technic of the combined operations plus improvements will be described

In patients with tracheotomy, preoperative sedation is recommended My preference is for either 1/4 grain (0 015 gm) of morphine or 1/3 grain (0 020 gm) of pantopon combined with atropine 1/150th grain (0 0004 gm) To patients on whom tracheotomy is to be performed be it a preliminary tracheotomy or combined with the plastic operation, any sort of sedation is absolutely contraindicated This statement holds good as regards tracheotomy done under any and all circumstances

The combined operation can be and has been performed under local anesthesia However, this is less practicable than general anesthesia and renders the use of the laryngoscope during the operation difficult Pentothal sodium given intravenously is highly satisfactory as an anesthetizing agent

TRACHEOTOMY

Before performance of tracheotomy, a syringe loaded with a solution of sodium pentothal is made ready A needle is inserted into one of the veins at the elbow and the syringe connected to it by rubber tubing When the tracheotomy operation has proceeded to a point where the trachea is opened and the cannula inserted, the pentothal solution is injected into the vein, and the procedure from thereon are continued under general anesthesia

The patient's neck is prepared by any of the accepted skin cleansing technics My preference is soap and water, followed by alcohol, ether, and merthiolate One percent of novocaine is then injected, infiltrating the tracheotomy area If the patient has previously had a thyroidectomy, I prefer a transverse incision for the tracheotomy rather than a midline incision Tracheotomy wounds are never aseptic Transverse incision will be further removed from the laryngoplasty incision than if tracheotomy is done using a midline incision

An incision 1½ to 2 inches long is made Skin flaps are dissected above and below just as is commonly done in goiter operations The fascia is opened by an up and down incision and the muscles separated This usually exposes the trachea as in most instances the isthmus of the thyroid gland will have been removed The trachea is opened longitudinally The opening should begin about ½ inch below the level of the transverse incision in the skin Otherwise when the skin is closed, the upper flap will exert pressure and leverage on the cannula with the possibility of pressure decubitus on the posterior wall of the trachea at the lower end of the cannula One number 0 chromic catgut suture is taken in the muscles above and one below the cannula The skin is closed with interrupted silk sutures If the opening in the trachea is made at the proper level, the skin may be closed snugly around the cannula with no tendency for the upper flap to override A no five cannula for women and no five or no six for men should be used

After the tracheotomy is completed, a small catheter attached to a suction tube is inserted into the opening for the purpose of removing blood or clots which may have accumulated in the trachea or bronchi At this point a redraping of the patient is necessary A woven wire tea strainer is placed over the tracheotomic cannula, the mesh of the strainer having been at one point spread by a pointed hemostat Into this opening a catheter connected to an oxygen tank is inserted Over the strainer and tracheotomy field a sterile towel is spread, the edge of which is placed just above the rim of the strainer Over the towel is placed a sterile 2 ft sq of rubber sheeting or oiled silk Both are fastened snugly by means of skin clips to the skin above the strainer and transverse incision This is done to prevent expired air from the tube blowing over the new operative field

LARYNCOPY

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An incision 2½ to 3 inches long is made over the lateral border of the larynx or thyroid cartilage. It should be parallel to and ½ to ¾ inch in front of the anterior border of the sternomastoid muscle. To a righthanded surgeon the left side of the neck will offer an easier approach. The skin and platysma muscle are incised. The superficial layer of the deep fascia and the tissue lying between the sternomastoid muscle and the lateral border of the thyroid cartilage muscles are opened. The incision exposes the anterior belly of the omohyoid muscle. When the sternohyoid and sternothyroid muscles are retracted forward the fibers of the inferior constrictor of the pharynx appear. These fibers are attached to the border and outer plate of the thyroid cartilage and must be cut. The pharyngeal mucosa is then exposed. It usually contains neither longitudinal nor circular fibers, is quite thin, and care must be exercised in separating it from the border of the thyroid cartilage, pyriform fossa, and the posterior surfaces of the cricoid and arytenoid cartilages.

There is a space of about 1½ inches along the outer border of the thyroid cartilage in which no important structure is to be encountered. It extends from the superior cornu to the inferior cornu. At the superior cornu there is danger of injury to the internal division of the superior laryngeal nerve. At the inferior cornu there is danger of injury to the external division of the superior laryngeal nerve.

When the posterior surface of the cricoid cartilage is exposed the atrophic fibers of the crico-arytaenoideus posticus are brought into view. This is the best landmark for the moment. The upper rim of the cricoid cartilage is then felt and the palpating finger slid outward on this rim or border. In the unparalyzed larynx it is easy to palpate the arytenoid cartilage, particularly its muscular process. This is not true in the paralyzed larynx, however, because the arytenoid cartilage is drawn forward by contracture into a horizontal rather than the normal perpendicular position.

If one observes the fibers of the posticus muscle and cuts them with a small sharp scalpel at a point about ⅛ inch from the upper end, the crico-arytenoid joint will be opened. This joint, like any joint that has been immobilized for months or years, will be found in a state of ankylosis. In order to mobilize it, the joint capsule must be divided completely. There is an internal lateral ligament to the joint which dips over the rim of the cricoid and is attached to the anterior surface of the cricoid. The ligament is small but strong and its division is important. The fibers of the interarytenoid muscle are then divided close to the arytenoid cartilage. A small skinhook is passed around the arytenoid underneath the laryngeal mucosa. By this means one can gauge the amount of mobility that is established. It is desirable to cut the fibers of the crico-arytaenoideus lateralis. By so doing a greater degree of mobility is secured. Then, for a successful displacement of the cartilage, almost complete disarticulation is essential. Maintenance of the proper degree of displacement and rotation must be the object of the next procedure.

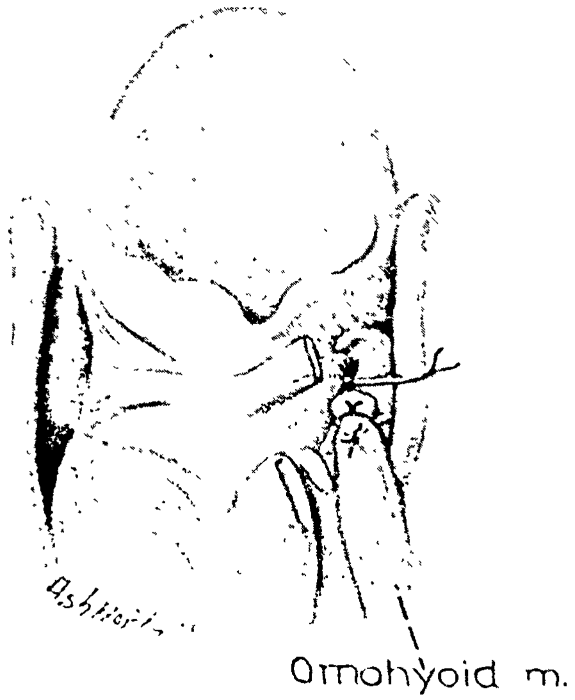

Fig. 2. This illustration shows the completed operation with the arytenoid cartilage fastened in outward position and the omohyoid muscle fixed to its muscular process. The wound is now ready for closure, which completes the operation.

Because of inequalities in the width of airways secured by the technic originally described, two modifications of it have been made. In the original procedure two sutures were passed—either through or around the arytenoid cartilage. One of these was passed through the posterior border of the thyroid cartilage and tied tightly. The other was used to fasten the omohyoid muscle to the arytenoid (that muscle is seldom transposed today). Efforts to pass a needle through the cartilage were abandoned because of the frequency with which the cartilage was fractured. The first real change in technic was described by Jackson and Jackson.[8] The procedure consisted of cutting a notch in the border of the thyroid cartilage into which the arytenoid was displaced and fixed. This technic produced a greater outward displacement of the arytenoid and uniformly secured a wider airway.

In one patient, in whom it was used, an infection developed in the wound which resulted in the infection invading the thyroid cartilage with a consequent small draining fistula which required nearly one year to heal. The functional result was not influenced by the infection. Since the antibiotic drugs have been introduced, in each instance we have dusted crystals of sulfathiazole into the wound before closure. This has reduced infections to practically zero.

As infections have occurred in a higher percentage of these operations than is ordinarily experienced in aseptic operations, and as infections of cartilaginous tissues are notoriously difficult to heal, it seemed desirable to devise a technic which would be less subject to this hazard.

From the beginning it was realized that the operation failed in one detail to conform with the normal physiology of the larynx. The normal vocal cords are opened to a larger degree by outward rotation of the arytenoid cartilages than by outward diplacement. A method of technic securing both outward rotation and displacement of the arytenoid cartilage seemed desirable. Such a technic has been devised and in all instances where it has been used, an adequate airway and a usable voice have been secured.

When the arytenoid cartilage has been thoroughly mobilized and the interarytenoid muscle divided along with some fibers of the crico-arytaenoideus lateralis, a hook is passed around the cartilage. This greatly aids the surgeon in passing a needle around the cartilage. The needle should closely hug the cartilage and not enter the laryngeal cavity. A full curved rather strong trocar needle threaded with number 0 chromic catgut is used. The diameter of the curve of the needle should be about ½ inch. The needle should always be passed from the mesial side outward.

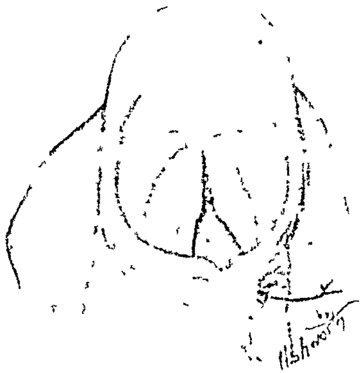

Fig. 5. This is a drawing of the actual appearance of the cadaver's larynx following operation. It does not truly represent the appearance of the paralyzed larynx. In the paralyzed larynx the right cord will be seen with the vocal band in a perfectly straight line and occupying a midline position. The left cord will also be in a straight line but in a position of outward displacement, but with less airway than is shown in this illustration. It is not desirable to produce an airway as great as is portrayed in the illustration. The cords in the paralyzed larynx are more rigid and therefore more difficult to displace than in the unembalmed cadaver's larynx. One should not expect to visualize a similar position of the cords to that shown in this illustration.

The arytenoid cartilage on cross section is somewhat triangular in shape. Two sutures only are passed around the cartilage. One is for rotating and displacing the cartilage, the other passes around the arytenoid and through the border of the thyroid cartilage and supplements the first stitch and holds it outward. A few inches of the tail of the upper of the two sutures are cut off and folded three times, this makes eight strands; around these eight strands the same suture is tied. The ends of the eight strands are cut off with scissors leaving a bundle 1/8 inch in length. The purpose of this is to create a large knot which will hang in the tissues at the anterior edge of the arytenoid cartilage. The needle is then passed through the thyroid cartilage near the border. When the needle is pulled, the arytenoid cartilage is displaced outward in a moderate degree of rotation. At this point, the wound is covered with sterile gauze and a sterile towel thrown over the field. A laryngoscope is then passed and while the assistant makes traction on first one and then the other end of the knotted suture, the position of the cord and width of airway are thus observed.

It is well for the surgeon to have familiarized himself with the larynx before operation and also to observe through the laryngoscope what has been accomplished. If the laryngoscopic examination shows a satisfactory airway, the suture is tied with greater traction on the needle end. If there is doubt about having produced an adequate airway, it is advisable to go back and do a more thorough disarticulation of the crico-arytenoid joint. The second suture is the same as the first. The fibers of the inferior constrictor muscle are then sutured, the fascia and skin closed. (The suture found most fitted for surrounding the ytenoid cartilage and displacing it outward s number 0 chromic catgut, on a strong trochar pointed needle, manufactured by Davis and Geck and sold under the number P271.)

This operation was originally conceived on
the theory t he omohyoid muscle would
replace the fu of the paralyzed crico-
arytaenoideus That theory has not
been well sustain believed today that
the transposed mu a role of minor
nportance and tha obtained are
marily the result otation and
cement of the ar re and its
ident vocal cor

The laryngeal ensemble is a complicated one; it is too lightly and glibly passed over in the dissecting room and in anatomies. To appreciate its physiology and disturbances in function, and particularly to correct any critical malfunction, will demand a detailed dissecting-room knowledge of its architecture, innervation, and musculature.

The technic should be practiced on the unembalmed cadaver before on the living subject.

A sufficient number of operations that involve the described technic have been performed to establish the value of the operation and experience has proved that when properly performed, an adequate airway can be assured, also a usable voice secured and the patient can be freed from the necessity of enduring a permanent tracheotomy tube.

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Technic of Thyroidectomy

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THYROID surgery has advanced from one of the most hazardous to one of the most satisfactory and safest types of surgery.

The technic of thyroidectomy depends upon numerous factors The size of the goiter, its shape, location, toxicity, the degree of friability or degenerative processes, and finally whether there are inflammatory or malignant changes present. All these influence the various steps to be made during operations on this organ. While no two goiters are exactly alike, and no two operations can be exactly the same, the basis and fundamental principles of thyroid surgery should be adhered to in every instance.

Many goiters require very little preparation for surgery and some require none. The great majority of even the toxic goiters can be safely and adequately prepared by the conventional method of treatment. This consists of iodine, sedatives, a high caloric intake and rest.

"Experienced judgment in the preparation of these patients and the decision concerning the optimal time for operation are of equal, if not greater importance than the technical procedure. The same may be said of anasthesia and postoperative management, since without experience and judgment in these fields, a thyroidectomy, although scientifically executed, may have an unsatisfactory result. In no other field of surgery is a greater variety of skill and experience needed to obtain a good result and a low mortality."[1]

The standardized requirements for safe thyroid surgery are the following:[2]

1. A favorable pulse rate.
2. Stationary weight, or gain in weight.
3. Lessened nervousness.
4. Satisfactory aponea test.
5. Satisfactory basal metabolic rate.
6. Satisfactory morale.

The requirements listed above must be met, and it may be said that the time element is of no importance within itself, but each and every requirement must be met regardless of the time element.

The condition of the vocal cords should be known, as well as the level of the blood calcium both prior to and following the operation and this is especially important for cases of recurrences.

The conventional method of treatment for preparing toxic goiter patients seems to have stood the test of time in a most satisfactory manner. This customary routine reduces the preoperative therapy and hospitalization to a minimum and safely so, provided the judgment of the patient's condition is correct.

Where it is necessary to adopt measures further than the conventional method the antithyroid drugs may be employed under close observation. Many patients, as is well known, do not tolerate antithyroid drugs, and in such cases use of the drugs should be discontinued before harm is done.

It is well to remember that every toxic thyroid that does not respond to treatment and does not die will, if given time, have a natural or spontaneous remission. If the remission does not occur and the patient dies, the surgeon can be reasonably certain that, had he intervened with some drastic, emergency measure, he would probably have hastened the patient's death.

Finally, the patient as a whole must be considered and not merely the pulse rate, the basal metabolic rate and the like. Associated pathology is frequently present, and it must be determined whether the pathology present will influence the morbidity or the mortality.

There are various technics of doing goiters, and also various anaesthetic agents. Many surgeons are followers of two stage operations and the like. It is the author's opinion that the operator should be well acquainted with all technics. The anatomy encountered should be well understood. Frequently the surgeon will develop his own method of procedure. In the opinion of the author, each patient should be sufficiently prepared to undergo a total thyroidectomy without undue danger. If the progress of the operation and the patient's condition warrant, then the operation can be terminated with a lobectomy, or packing and a delayed closure.

Once the patient has been satisfactorily prepared—the operation should begin. This may be carried out under either local or general anaesthesia. Many surgeons prefer general anaesthetics of various types and report good results. The author prefers local anaesthesia. As Crile stated: "Any general anaesthetic does some harm to the patient." The more toxic the patient, the more important is the anaesthetic.

With local anaesthesia, a basal anaesthetic of three grains of sodium amytal the night before and six grains of sodium amytal two hours prior to the operation, with one-sixth grain of morphine, places most patients in an ideal condition. Before the six grains of sodium amytal are administered the patient brushes her teeth, urinates, has her eyes bandaged, and is placed on the carriage on which she will be taken to the operating room 30 minutes before surgery. The carriage is so constructed that it is actually an operating table, and no transfers are necessary, either prior to or immediately following the operation. It is important that the patient understands the day before operation all that is to happen except the actual operative steps. This places the finishing touches to the patient's morale.

Three to six cc. of two percent novocaine, with or without adrenalin as indicated, are used for blocking the superficial cervical plexus at a point midway between the mastoid process and the manubrium just lateral to the sternomastoid muscle. Then following an injection of two cc. of two percent novocaine medial to the muscle at a point one-half to one inch lower than the first injection, in order to block the descending branch of the 12th nerve, which supplies the ribbon muscles. A like procedure is carried out on the opposite side. The rest of the cervical region may or may not be infiltrated with novocaine, one-half or one percent.

Most authors adequately call attention to the value and necessity of good, sound and mature clinical judgment. This cannot be replaced even in a minor way with laboratory tests. Tests should be a confirmatory precaution, not a substitute for experience and clinical judgment.

One should keep constantly in mind the complications that could arise during or following the operative procedure. These are: hemorrhage, thyroid crisis, stridor, shock, collapse, tracheaitis, pulmonary complications; cardiac complications, embolism, alimentary tract complications, serum collection, acute hypothyroidism, infection, hyperthyroid psychosis, and tetany.

The Incision: It should be as short as possible as these patients wear their scars the rest of their lives. However, inadequate exposure should not be sacrificed for the sake of comeliness. The skin of most necks stretches marvelously well, and it surely is not necessary to slit the neck from ear to ear or to make an unduly long incision. In one stroke the platysma should be divided with the skin. The bleeders, if any, are clamped and tied.

After the skin flap has been turned back or up and the lower portion turned down, the cervical fascia must be divided. This should be divided as far upward as possible and far enough downward so that the lower poles can be brought into view.

It is not necessary to divide the ribbon muscles because if the goiter is large the ribbon muscles are already stretched and can be retracted over the gland then downward and laterally, in reality assisting in the elevation of the gland itself.

During all this time the pulse is counted and recorded by a competent nurse or anaesthetist. At this particular point the pulse should have dropped a little and the patient become a little more stable.

The operator has now reached more important steps in the technic.

The proper plane of surgical cleavage must be entered. This is mandatory. This plane is between the true and the false capsule of the gland. This is the exact step that too many surgeons miss and by so doing, work with and terminate with an untidy job to the detriment of the patient's immediate well-being and effecting an unsatisfactory post-operative course. The false capsule must be preserved, as the parathyroid bodies are contained therein. This will prevent tetany. The patient having met the essential requirements, the operator will next determine whether the gland itself is in the proper condition for removal. If fibrosis is present to the extent that the gland cannot be rotated easily the job will be difficult. If the lobe under attack can be rotated medially in an easy manner the job should be relatively simple.

The Larger Lobe Should be Attacked First After rotation of the gland, the upper pole must be dissected out, clamped, divided and sutured. This may be done with hemostats or with ligature carriers passing from the medial to the lateral side protecting the superior laryngeal nerve. Then the inferior pole is clamped, avoiding the inferior laryngeal nerve. It is helpful to have the patient respond to questions at this point Next the lateral veins are clamped. These exact steps may now be carried out on the opposite side, provided the gland is to be removed en toto

Whether the entire gland or only one lobe is to be removed at a time, the trachea should be located at this point, clamps placed beneath the gland, not in the gland substance itself and the fibrous tissue divided. It has been abundantly demonstrated that there is adequate room between the gland and the inferior laryngeal nerves for the placing of thin clamps and the preservation of the nerves The clamping and division of the fibrous tissue is continued until the entire gland is removed.

The pulse is still being counted each three or five minutes and recorded by a competent member of the team so that the operator at all times is aware of the pulse rate. There should be a continuous decline

Now all the clamps are tied No. 0 catgut is used because it is easy to work with and quickly absorbed; and, guarding against the day when an inevitable infection occurs, the neck will not have to drain until all the foreign body (non absorbable sutures) have sloughed out.

Following this technic a practically bloodless operation can be done. It is important at this point to make sure that there is not the least amount of bleeding for the reason that hemorrhage is the great complication that is capable of encouraging so many other complications, namely: crisis, stridor, shock, collapse of trachea, tracheaitis, embolism, serum, infection, psychoses, tetany.

Now saline or one-half percent novocaine may be poured in the wound and the closure begun without drainage. All tissues are approximated and sutured. The author, adopting the Crotti technic has found a subcuticular stitch very valuable for the skin closure, producing a scar that in most instances can hardly be seen. The suture is pulled out on the second postoperative day. Then the neck is bandaged and the patient returned to her room and bed, and permitted to have fluids by mouth.

Under local anaesthesia it is extremely rare for the pulse not to be better at the closure than at any time during the hospital stay. This cannot be said for general anaesthesia, for inhalation anaesthesia within itself does some harm to the patient and particularly the toxic thyroid patient.

If the proper preparation of the patient has been carried out and the operative procedure has gone along well the postoperative course should be smooth, or at least without any undue events. Even the toxic cases will be ready to leave the hospital in a few days. But when complications have ensued the matter of recovery and leaving the hospital depends upon the nature and severity of the complication (a discussion within itself). The toxic patient can frequently be ambulated 24 hours after the postoperative reaction has subsided, and the non toxic case can be ambulated even earlier; however, in the opinion of the author, nothing is gained and it may not always be wise to ambulate these patients too early.

From surveys it is thought that the mortality rate for the larger and better clinics and surgeons who have a deep interest in thyroid surgery may run as low as .5 plus percent. But if the true mortality rate were known; that is the mortality rate figuring all goiters done, no doubt, it would be appalling.

In a paper read before the Arkansas State Medical Society, April 1948, the author presented 11,536 thyroidectomies done by 12 outstanding and prominent clinics and surgeons with a deep interest in thyroid surgery. They listed 67 deaths. The author added 882 thyroidectomies of his own from one institution

(St. Vincent Infirmary, Little Rock, Ark.), consecutive cases with one death. This made a total of 12,418 cases with 68 deaths for a mortality rate of .547 plus percent. Since the above report the author has added 133 cases to the 882 above making 1015 cases for a mortality rate of a little less than one-tenth percent.

Since any death following thyroid surgery could probably be avoided if the surgeon were able to handle the case over again, the ideal goal in goiter surgery is a mortality rate of zero percent; and this is not beyond the realm of possibility for the qualified surgeon who is willing to give the time, attention and postoperative care necessary. A death from thyroid surgery should certainly be a rarity.

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Treatment of Hyperthyroidism
Especially with Radioactive Iodine

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THE treatment of hyperthyroidism or Graves' disease is in an unsettled state and will continue to be so until investigation reveals a process by which the adjustment can be made at the physiologic level of the endocrines All methods of present treatment, surgical, antithyroid drugs iodine or radiation either external or internal impinge on hormone production and so represent an attack on the end results of the disorder We hope and expect that in our time better treatments will be discovered

But let us examine the treatments now available to control a thyroid that is disordered and seems to be consuming the patient in the fire of his own metabolism

First, we must *recognize that a certain* number of persons go through the cycle of the disease and by avoiding doctors they avoid treatment The natural history of the disease seems to be one of remissions and exacerbations In time the hyperthyroidism may burn itself out and finally the patient goes into myxedema Few doctors have had the restraint necessary to observe the natural history of this disorder—or any other—without trying to do something to the patient Hastening to do something for a patient is often yielding to the inordinate demands of the patient but more likely it is based on the doctor's fear of the future clinical course of the disease One classic observation that I know of is that of the celebrated English clinician W Hale White During his long career in the latter part of the 19th century he followed 12 thyrotoxic persons and in his old age reported[1] that seven died on an average of three and a half years after the onset of the disease and that five lived on quite well for many years without so called specific treatment

Surgery was attempted in his time but it was a very hazardous procedure until 1923 when the observations of H S Plummer[2] established the value of iodine in quieting the disordered thyroid It is a curious thing that iodine had been held in low repute and was an outcast for half a century from medical teaching until that simple classic two paragraph paper of Plummer's pointed out the value of iodine in smoothing the postoperative course of thyrotoxic patients

The profession quickly seized on iodine and proceeded to give it both before and after and without surgery to ameliorate the disease During the 1920's much of this fundamental work on the iodine response was done in the Thyroid Clinic of the Massachusetts General hospital by Professor J H Means[3] and his associates They defined the iodine response, the effective dose, the causes of failure the frequency of the metabolic response and the several clinical *results of this treatment alone or in conjunction* with subtotal thyroidectomy It is still a good means of treatment in mild forms of the disease and we still use it

Patients with mild disease may be controlled by the daily administration of five drops of a saturated solution of potassium iodide (250 mg of iodine) There is no advantage of iodine in any other chemical form The basal metabolic rate falls an average of 3 6 points per day for 10 to 12 days after the institution of iodine therapy The ratio of fall is predictable and having reached its maximum in about 12 days the disease thereafter continues at about that level, although the future course on prolonged iodine medication varies from complete disappearance of the disorder to a return of the disease in such fury as to necessitate a change or addition of another form of therapy

The constancy of this response to iodine is such that where the other functional tests are not available it may be applied as a diagnostic test in cases where the basal metabolism rate is at the usual normal level or only slightly elevated

The great boon of iodine to thyroid surgery was summarized by Boothby[4] at the Mayo Clinic in 1935 He showed how it made the gland less vascular and easier to handle, how it reduced the need for multiple operations and introduced the subtotal thyroidectomy in which four-fifths of the gland is removed at one operation. The operative mortality dropped from four percent in 1923 to well below one percent by 1935.

In the period from 1943-1948 we have seen the medical management of this disease come to the fore. The introduction by Astwood[5] of drugs of the thiouracil series, has provided a means to adequately control the mild or moderate forms of the disease.

The predicted rate of fall of the basal metabolism rate is about one percent per day for diffusely hyperplastic goiters and much slower in nodular toxic goiters treated with thiouracil drugs. However effective this drug is, we must remember that it means continued observation and expense. The doctor has to watch for toxic reactions which occur in about two percent of patients and the patient continues to have a goiter that may even increase in size under treatment. As yet we have not learned the true incidence or time interval of recurrence after omission of the drug from patients who have been well treated. In severe disease with large goiters these drugs may be quite ineffectual.

RADIATION TREATMENT

In 1901 when Professor Henri Becquerel of Paris was carrying a small vial of radium to a lecture in London there was produced a small reaction on the skin of his belly. He was quite amazed by this and consulted his friend, Dr. Besnier and in this consultation was conceived the idea of treating tissues by means of radioactive materials.

By 1902 Williams, (Boston) was treating hyperplastic thyroids with externally directed x-rays and in 1905 Dr. Abbe (New York) reported a case successfully treated by implanting radium in a small tube directly into the substance of the thyroid gland. He is said to have received this idea of placing radium in a glass vial from the inventor, Alexander G. Bell.

From 1902 to 1934 there were many goiters treated by the external application of x-rays. Menville[6] in 1932 collected 10,541 cases of hyperthyroidism treated by 75 radiologists in the United States and Canada. Of this large group 65 percent were considered cured, 21 percent improved and 15 percent failed to respond to the treatment. Such external radiation is more effective on the *non-iodinized gland.*

In the year 1934 Madame Curie's daughter[7] demonstrated that certain light elements (boron, magnesium, aluminum) which had been bombarded with alpha particles continued to emit energy for a short time after the bombardment was stopped. In other words, alpha particle bombardment produced radioactive forms of these light elements. This discovery stimulated similar experiments all over the world. In Italy the physicist Fermi[8] reasoned that neutrons, because of their lack of charge, should be effective in penetrating nuclei. He was able to verify this and found that the nucleus of the bombarded atom captured the neutron, and that thus there was produced an unstable nucleus which achieved its stability only by emitting an electron. Thus the final stable nucleus became an isotope which is one unit higher in mass number and one unit higher in atomic number.

As a result of many experiments starting in 1934, radioactive isotopes of every element in the periodic table was produced. One of the first such isotopes was radioactive iodine.

The use of radioactive iodine in treating hyperthyroidism is based on two facts:

1. The natural avidity that the thyroid has for collecting iodine.
2. The release of the electron within the thyroid that sends beta rays only a few millimeters into the tissue. Beta rays act the same as x-rays. The gamma rays released probably have no effect on the thyroid.

This highly selective form of radiation therapy was started at the Massachusetts General hospital by Dr. Saul Hertz in 1941 and one year later he made a preliminary report of his experience.[9] At the same time Hamilton and Laurence[10] reported their experience from California. Hertz continued this until 1943 when he joined the Navy. In the treatment of his cases *both* radioactive and ordinary iodine were used. It fell to Professor Robley Evans and myself to carry on this work and on analysis of the situation, we felt that we could not be sure whether those patients of Hertz who had improved were responding to the radioactive iodine, the ordinary iodine, or their

TABLE I

Data on 65 Patients with Hyperthyroidism Treated Only with Radioactive Iodine (I^{130}, 12 hour half life)
1943 1946

45 gm	Average estimated thyroid weight
32 millicuries (14 79)	Average single effective dose by mouth
0 45 millicurie/gm	Average single effective dose retained per gram thyroid
6	Radiation sickness
3 days	97 percent of radiation delivered in approximately
15*	Given second doses
1 month	Average interval to normal basal metabolic rate
50	Responded and continue well
11	Resulting hypothyroidism
3	Better, but toxic six months after treatment
1	Died, January 1949 Autopsy—11 gm fibrosed thyroid
0	*Recurrence of disease*
65	

* Five of these received I^{131} for their second dose the other 10 received I^{130}

combination Consequently, we decided that definitive use of this new agent could be established best by a program that would cover the following five points

1 The use of radioactive iodine alone

2 The definition of the single effective doses—the duration of its effects—the pattern of relapse if any of thyrotoxicosis

3 The production of myxedema by a single dose

4 The observation of the histologic changes in the same gland both before and after such treatment

5 The observation of the toxic effects of radioactive iodine

In 1946 we reported[11] our experience in treating patients with the isotope I^{130}, which has a half life of 12 hours

These results are depicted in Table 1 and it was then and is now our belief that radioactive iodine is another effective method of controlling hyperthyroidism We answered the five points

From 1946 to January 1949 we have used the eight day isotope I^{131}, in treating an additional 100 patients with this tissue selective radiation The results in these patients are shown in the following tables This material comes from the United States Atomic Energy Plant at Oak Ridge, Tenn

TABLE II

100 Patients Treated with I^{131}
August 1946—January 1949

Average estimated thyroid size	50 gm
Average single effective dose by mouth	8 MC
Average single effective dose retained	0 11 MC /gm

TABLE III

100 Patients with Hyperthyroidism Treated Only with Radioactive Iodine with Half Life of Eight Days, I^{131}
August 1946—January 1949

Responded and continue well	
1 dose	78
2 doses	10
Better but toxic six months later	10
Treated within two months	1
Died, myocardial infarction	1
Operated, other treatment, recurrence	0
97% radiation delivered in	30 days
Radiation sickness	0
Average interval to normal BMR	2 months
Resulting hypothyroidism (2 for heart disease)	8 patients

The chief objection now raised to this radiation treatment is that its action might cause a thyroid cancer to appear in later years In discussing the quantitative aspects of radiation carcinogenesis in humans Evans found that the doses required to produce osteogenic sarcoma by chronic radium poisoning, lung carcinoma from breathing radon liver sarcoma following thorotrast and skin carcinoma following exposure to gamma rays have the following factors in common

1 A delay of 10 to 20 years between the

begining of radiation and the recognition of malignancy.

2. A low level radiation dose maintained over a period of many years.

From this comparative analysis it seems extremely unlikely that radioactive iodine therapy that releases 97 percent of its energy into the tissues in 30 days will induce carcinoma in the thyroid or urinary excretory passages.

SUMMARY

There are five good methods to control hyperthyroidism and all of these are being used effectively.

1. Iodine alone.
2. Propyl or methylthiouracil.
3. Subtotal thyroidectomy after preparation with one or both of these drugs.
4. External radiation by x-ray.
5. Internal radiation by release of beta rays from I^{131}.

Possibly a new and more physiologic method of controlling the disease will be developed in our time, but only the test of time will establish which of these five methods is the simplest, safest, and least expensive and so the best one for the patient.

RIASSUNTO

Cinque sono i metodi per controllare l'ipertiroidismo e tutti quanti efficaci:

1. Iodio solamente.
2. Propil o metiluracile.
3. Tiroidectomia subtotale dopo preparazione dei pazienti con l'una o l'altra sostanza.
4. Irradiazione esterna con raggi X.
5. Irradiazione interna mediante liberazione di raggi beta da I.^{131}

Puo' darsi che altri metodi, ancora piu' fisiologici, vengano scoperti per la cura di questa malattia, ma solamente un ulteriore periodi di osservazione potra' stabilire quale di questi cinque metodi sia il piu' semplice, il piu' innocuo, il meno costoso, e con cio' il migliore per il paziente.

SUMARIO

El medico posee cinco metodos de control del hipertiroidismo.

1. El yodo solamente.
2. El propil- o el metiltiouracil.
3. La tiroidectomia sub-total con preparacion previa por uno o ambos de los medicamentos mencionados.
4. La irradiacion externa de la glandula por los rayos-X.
5. La irradiacion interna por los rayos beta del I-^{131}.

SOMMAIRE

Il y a cinq bonnes méthodes pour contrôler l'hyperthyroïdisme et toutes ont été employeés avec efficacité.

1. Iode seule.
2. Propyle ou méthythiouracile.
3. Thyroïdectomie sous-totale après préparation avec un ou deux de ces medicaments.
4. Radiation interne par relâchement de rayons bétas.

Probablement qu'une nouvelle méthode plus physiologique pour contrôler cette maladie sera développeé sous peu, mais seulement le temps nous dira la quelle de ces cinq méthodes est la plus simple, la plus sûre et la moins coûteuse. C'est à dire la meilleure les malades.

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Pre and Postoperative Care of the Patient with Hyperthyroidism*

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CAREFUL pre and postoperative care of the patient with hyperthyroidism is imperative if restoration of normal function is to be accomplished Here, as much as any place in surgery, the internist and surgeon cooperate closely, both before and after the necessary surgical procedure is carried out. *As soon as the patient enters the clinic for* examination, the internist and surgeon work together to evaluate the patient's general condition, decide on the preoperative treatment necessary, the date of the operation and the postoperative care, including care of any complications that may arise. It is important that the patient and the relatives understand fully the condition which the patient has, the reasons why surgical intervention is necessary and the future prognosis of the patient.

Operative Risk: It is the practice of Mason and Zintel to classify each patient with hyperthyroidism with regard to operative risk prior to instituting preoperative treatment. Among the factors they take into consideration in the grading of operative risk at the time of entry, are duration of the disease, age of the patient, loss of weight, pulse rate, pulse pressure and history suggestive of episodes of crises or cardiac complications After examination of the patient by the internist, the necessary laboratory procedures are ordered and a consultation held with the surgeon, as well as with any specialists that are indicated because of liver, cardiac or other complications the patient may have. A routine laryngoscopic examination as suggested by Pemberton and his associates is always carried out.

PREOPERATIVE PREPARATION AND CARE

Rest and Recreation: During the course of the physician's discussion with the patient concerning the disease which he has, the necessity for adequate physical and mental rest is repeatedly emphasized The physicians and nurses soon realize that such patients are easily upset by minor irritations In addition to adequate sleep and rest, the patient should be encouraged to partake of recreation that requires only minimal physical and mental effort.

Fluids: Most patients with hyperthyroidism are thirsty and therefore will require little urging to insure an adequate fluid intake by mouth of at least 3000 cc. daily. More fluids are required if there is diarrhea, undue sweating, nausea, emesis or elevated temperature. If the patient cannot take the necessary amounts of fluids orally, five percent dextrose in distilled water or a ten percent solution in the case of the markedly toxic patient are given, inasmuch as the carbohydrates are of definite benefit. In the severely toxic patient who does not have a good response to preoperative preparation, a 1000 cc. blood transfusion may prove beneficial.

Nutrition: If the patient is to gain or maintain weight during the preoperative period, Mason, Zintel, Lahey and the great majority of others in this field prescribe additional food according to the elevation of the metabolic rate. For example, a man with a metabolic rate of 50 doing a moderate amount of muscular work requires 6000 calories daily to maintain his weight. This is the reason why thyrotoxic patients who carry out manual labor always show striking undernutrition.

Lahey and his associates keep daily weight and basal metabolic graphs on all patients with hyperthyroidism and consider a gain in weight as one of the best indications of improvement. Ordinarily, tea, coffee, tobacco and alcohol are not allowed.

It is now accepted that the liver is damaged in many patients that have hyperthyroidism and in some instances jaundice has been noted. If there is clinical or laboratory evidence of liver damage, Ravdin has found that the liver can be improved in function by

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From the Lovelace Clinic, Albuquerque, N Mexico high protein (25 percent), high carbohydrate, low fat diet.

Boothby, Mayo and Lovelace have advocated the routine administration of high concentrations of oxygen postoperatively in hyperthyroidism when there is any liver damage with its attendant sensitivity to even minimal anoxemia. For the same reason, when gas anesthesia is administered, it should be given with a high concentration of oxygen.

On the basis of Means' observation that cardiac manifestations occurring in patients with hyperthyroidism resemble those that occur in patients with vitamin B_1 insufficiency, vitamin B_1 and the B complex are given before and after surgery. These patients receiving vitamin B_1 therapy have improved more rapidly prior to surgery than those who did not as was the experience of Mason and Zintel. The average dose is riboflavin 10 mg., thiamin 20 mg., nicotinic acid 20-30 mg. and ascorbic acid 100-150 mg. a day.

OPHTHALMOLOGIC CARE

When the patient has exophthalmus to such a degree that it is impossible to completely close the eyelids, goggles which have no ventilation are often worn, thus keeping the eyes moist. This is accompanied by two to three drops of Ringer's ointment in each eye, four to five times a day. The same procedure is followed postoperatively. The Ophthalmologic Section is responsible for the eye care of these patients and carries out a detailed pre and postoperative examination.

Iodine: On the basis of the work begun by Plummer in 1923 each patient is given 10 minims of Lugol's solution three times daily. Improvement is evidenced by gradually diminishing irritability, restlessness, nervousness, tremor and tachycardia. Means has found that the basal metabolic rate fell 3.7 points each day in those patients that responded well to iodine therapy. Patients are given iodine at least 10 days prior to surgery and some patients may require it two to three weeks prior to surgery before they are ready.

Propylthiouracil: At present our use of propylthiouracil prior to surgery is confined to those patients that would otherwise require stage operations because of unusually high basal metabolic rates, very large glands and poor operative risk. These patients comprise approximately 10 percent of cases that require surgery.

The average dose of propylthiouracil is 100 mg. t.i.d. Approximately 25 percent of patients require 400 mg. a day and one patient has required 700 mg. a day. It has been possible to reduce the basal metabolism to about + 10 or below with this regime, as reported by Lahey, and for this reason operation is not carried out until metabolism has reached normal levels. Two weeks prior to contemplated surgery, the patient is started on Lugol's solution in an effort to decrease the technical difficulty that would otherwise occur at the time of surgery.

Radioiodine: Our experience with the therapeutic use of the radioactive isotope of iodine, I^{131}, has been too short for us to make specific recommendations. Certainly, we are in agreement with Haines, Keating and their coworkers that I^{131} has its most important potential use in those patients with serious complications which are due either to prolonged hyperthyroidism or to associated diseases and in those in which exophthalmic goiter tends to recur repeatedly after treatment with antithyroid drugs or surgical treatment.

Haines and his associates record that an average dose or more than 200 microcuries per gram of thyroid tissue should be tried in cases in which an attempt is made to control the disease in a single dose. There is a wide variation in the sensitivity of different thyroid glands to radiation, and so far the incidence of both myxedema and of recurrence of exophthalmic goiter after treatment is much higher among patients treated with I^{131} at the Mayo Clinic than among patients treated surgically there.

Soley and Miller also feel that clinical judgment has been the most important factor in deciding what dose of I^{131} to use and feel that studies of the problems of dosage, measurement of radioiodine and distribution of radioiodine in the thyroid are necessary, before conclusions can be drawn as to the place of this type of therapy in the treatment of Grave's disease. Keating recently stated that it is difficult to determine the dose of radiation received in an individual case as this depends upon the weight of the thyroid, its rate of iodine turnover and the energies of isotopes employed.

At present we are studying the deposition and disappearance of radioiodine by placing a Geiger Muller Counter over the gland, the penetration of gamma rays of I^{131} making such counting possible. Other investigations in the use of radioidine will be carried out, including their use in the treatment of adenocarcinoma of the thyroid gland.

Immediate Preoperative Orders. Inquire as to upper respiratory infection.

Soapsuds enema the night before surgery.

Nembutal, gr 1½, the night before and the morning of surgery.

Make certain no drug idiosyncrasy exists.

Nothing by mouth on the day of operation.

Morphine sulfate, gr ¼ and atropine sulfate, gr 1/150, on call to surgery.

POSTOPERATIVE CARE

Position in Bed. A semi sitting position makes it easier for the patient to swallow and breathe and permits better rest.

Tracheotomy trays should be available on the floor.

Sedation. Morphine, gr ⅙, to gr ¼, is given every three hours as necessary.

Nembutal, gr 1½, can be used to promote sleep.

Patients with hyperthyroidism often have increased tolerance for morphine.

Oxygen. For the patient who has had a very toxic goiter, the routine use of oxygen in high concentrations by means of the B L B oxygen mask (Boothby Lovelace Bulbulian) or if the weather is warm an oxygen tent, is indicated, as it will decrease the respiratory minute volume, decrease the pulse rate and increase the oxygenation of the blood.

The effects of acute oxygen want that should be watched for are: errors in judgment, mental confusion, inability to concentrate, clouding of thought process and memory, restlessness, lassitude, headache, diminished night vision and dimming of vision, tremor of the fingers, elevation of temperature, pulse and respiration and cyanosis of the lips which can be detected when the oxygen saturation of the hemoglobin is 90 percent and is definite at 85 percent. A patient with anemia may not be cyanotic even if the saturation of the arterial blood is as low as 60 percent. Frequent and shallow breathing in shock is a symptom of which the serious import is often not realized. When anoxia is present in shock which is due to other causes, it is always a contributing factor and it may facilitate the establishment of a vicious cycle of events leading to general collapse. Anoxia itself, even in its early stages, may produce vasomotor collapse in some individuals.

Fluids. Forty drops of Lugol's solution are given in the first proctoclysis in 500 cc of tap water. In addition, 1500 cc of five percent dextrose in saline are given intravenously.

As soon as the laryngoscopic examination is carried out and the cords are found to be normal, cool water may be taken by mouth. If there is nausea or emesis, intravenous administration of fluids is continued so that the patient will receive 1000 cc over the measurable output in 24 hours.

Iodine. Ten minims of Lugol's solution in fruit juice are given three times a day.

Diet. A liquid diet is given second day after surgery, a soft diet is given on the third day and a high carbohydrate, high protein diet thereafter.

Oral Hygiene. Oral hygiene for patients not taking fluids can be accomplished by using orange or lemon slices, lemon and glycerin mouthwash, frequent alkaline mouth rinses and the application of vaseline to the lips.

Care of the Wound. The wound is first dressed at the end of 24 hours, the sponge rubber pressure dressing removed. If a drain has been inserted, it is removed at this time if the amount of drainage is small and the next day if there has been a moderate amount of drainage. The nylon 0000 monofilament skin sutures are removed on the fourth day. If serous drainage is present underneath subcutaneous tissues, it can often be aspirated with a small gauge needle attached to a syringe.

Out of Bed. If the patient is in reasonably good condition, he is allowed out of bed on the day after surgery, otherwise the second day after surgery, and he is usually dismissed from the hospital on the fifth day after surgery.

Supervision After Leaving the Hospital.

The Lugol's solution is continued for one to two months, at the end of which time the patient is re-examined and the basal metabolic rate determined. If examination is essentially normal, the iodine is discontinued. The patient is examined at two to three month intervals during the next year.

The patient is warned about the possibility of a relapse if he does not take good care of himself and especially if his previous environment has been responsible for the development of hyperthyroidism.

POSTOPERATIVE COMPLICATIONS

Hemorrhage: If hemorrhage occurs after subtotal thyroidectomy, it almost always results in respiratory obstruction caused by an accumulation of blood beneath the pre-thyroid muscles. This, in turn, results in difficulties in breathing and dysphagia. If hemorrhage occurs it is necessary to take the patient to the operating room and isolate and ligate the bleeding vessel.

Tracheitis: The trachea is often irritated after thyroidectomy as evidenced by the patient's frequent attempts to clear the throat and occasionally by the presence of hoarseness, cough, dyspnea and very tenacious mucous.

Treatment of tracheitis is best accomplished by inhalations of steam and the ingestion of warm fluids. If edema of the larynx progresses, tracheotomy may become necessary.

Thyroid Crisis: Treatment of thyroid crisis consists in the administration of high concentrations of oxygen, ice packs, morphine, nembutal to control restlessness, administration of ten percent dextrose in distilled water and iodine by rectum intravenously or by hypodermoclysis. Transfusion of whole blood may be beneficial.

Tracheal Obstruction: Tracheal obstruction can result from collapse of the trachea, pressure on the trachea from hemorrhage or, most often, as the result of injury to the recurrent laryngeal nerves. If as much as possible of the operation is carried out under local anesthesia, and if the patient is routinely awakened during subtotal resection of lobes on both sides, damage to both recurrent laryngeal nerves is impossible for all practical purposes.

Treatment of tracheal obstruction is by relief of the causative factor. If measures to accomplish this are not immediately successful, tracheotomy is performed, after first giving helium and oxygen therapy a therapeutic trial.

Parathyroid Tetany: The earliest manifestations of parathyroid tetany are usually tingling and stiffness in the feet and hands and numbness of the tongue, twitching of the face and beginning contraction of the fingers.

The more severe forms of parathyroid tetany are characterized by contractures of the hands in the accoucheur's position, convulsions, laryngeal spasm and rapid respiration. Chvostek's sign and Trousseau's sign are usually positive.

The treatment of parathyroid tetany in the milder forms consists in the administration of two to four grams of calcium lactate in hot water every two to four hours. Cod-liver oil, two to three teaspoonfuls daily, is helpful in promoting the utilization of calcium. Viosterol may be given for the same purpose. If the parathyroid tetany is very severe, five cc. of a 10 per cent solution of calcium chloride or calcium gluconate in 100 cc. of normal saline solution is given. Depending on the level of the blood calcium, parathyroid extract, 10 to 50 units once daily, can be given intramuscularly.

Albright and his associates have concluded that a more sustained rise in the blood calcium level can be brought about by the administration by mouth of dihydrotachysterol (this is also known at A.T. 10).

SUMMARY

Careful pre and postoperative care of the patient with hyperthyroidism is imperative if restoration of normal function is to be accomplished. Here, as much as any place in surgery, the internist and surgeon cooperate closely, both before and after the necessary surgical procedure is carried out. As soon as the patient enters the clinic for examination the internist and surgeon work together to evaluate the patient's general condition, decide on the postoperative care, including care of any complications that may arise. It is important that the patient and the relatives understand fully the condition which the patient has, the reasons why surgical intervention

is necessary and the future prognosis of the patient

RIASSUNTO

Nei pazienti affetti da ipertiroidismo e' necessaria un'accurata cura pre e postoperativa se si vuole ristabilire una normale funzione della tiroide Come in qualsiasi contingenza operatoria, anche qui si rende necessaria prima e dopo l'operazione un'intima collaborazione fra il chirurgo e l'internista La collaborazione incomincia dal momento in cui l'ammalato consulta la clinica, onde valutare le condizioni generali di salute decidere le opportune misure preoperative, stabilire la data dell'operazione e prospettare le cure postoperative nell'evenienza di complicazioni E' bene che tanto il paziente, quanto i famigliari, siano resi pienamente edotti della natura della malattia, delle ragioni che richiedono l'operazione, della prognosi

SUMARIO

El tratamiento pre y post operatorio del paciente con hipertiroidismo es de suma importancia si se quieren obtener restauracion completa de las funciones normales del paciente En esta enfermedad es imperativo la cooperacion completa del internista y del cirujano, tanto antes, com despues de la cirujia Entre los dos esta la responsabilidad de decidir el tratamiento pre operatorio, la fecha mas favorable para la operacion, y el regimen post operatorio incluyendo el tratamiento de las complicaciones que se presenten Tambien es de importancia el explicar al paciente y a la familia de el su enfermedad, las razones para la operacion y el prognostico post operatorio y en el futuro

SOMMAIRE

Le choix des soins pré et postopératoires donnés aux malades souffrant d'hyperthroidisme est très important si l'on veut obtenir une restauration complete de la fonction normale Ici, comme dans beaucoup d'autres conditions chroniques, il importe que le médecin et le chirurgien s'entendent avant et apres le procedé operatoire indiqué Aussitôt que le malade est admis a la clinique, le médecin et le chirurgien travaillent ensemble afin d'évaluer l'etat général du malade et de décider sur le traitement preopératoire approprié, la dâte de l'operation, le traitement postoperatoire et aussi les soins de toute complication qui peut survenir Il importe que le patient et sa famille soient renseignés l'état du malade, les raisons pour lesquelles une intervention chirurgicale est necessaire et le pronostic futur du malade

Preoperative and Postoperative Treatment in Hyperthyroidism[*]

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FOR several decades the most satisfactory treatment for hyperthyroidism, whether due to a toxic diffuse or a toxic nodular goiter, has been a bilateral subtotal thyroidectomy. During recent years with the advent of radioactive iodine and the antithyroid drugs, the indications for operation are much less absolute. This is particularly true as regards toxic diffuse goiter in which operation has by no means been a completely satisfactory procedure. Opinion as to the method of treatment of toxic diffuse goiter varies from that of those physicians who believe that all patients should be treated for cure by medical means to those who still think that all patients should be treated by surgical means. Most physicians agree that all patients with toxic nodular goiter should sooner or later have their goiters removed. Without entering into this controversy, and solely for the purpose of discussing pre- and postoperative treatment, let us assume hypothetically that all patients with thyrotoxicosis are to be subjected to a thyroidectomy.

After Plummer[25] in 1923 introduced iodine in the preoperative treatment of hyperthyroidism the method of treatment was fairly well standardized for two decades. It consisted essentially of (1) administering iodine as Lugol's solution in doses of five to 10 drops three times daily, (2) a high caloric diet and (3) partial rest. Such treatment gives a noticeable and prompt amelioration of symptoms in toxic diffuse or exophthalmic goiter. Treatment was continued as long as the patient continued to improve and when improvement ceased, usually after a period varying from three to eight weeks, he was operated upon. Depending upon his general condition a unilateral or bilateral subtotal resection was performed. The same preoperative treatment does not produce similar striking improvement in the symptoms of toxic nodular goiter. Indeed, improvement is of such little moment that most surgeons prepared the patient by the above means for only two or three weeks and operated upon him regardless of the severity of the disease or his general condition. About all that one could do was to remedy the effects of undernutrition or congestive heart failure and accept the surgical risk whether it were good or bad.

One could, by various criteria, estimate the surgical risk rather accurately but in adverse circumstances little can be done to diminish the risk other than pay meticulous attention to the operative and postoperative details. Thus Plummer's epoch making contribution, sharply reduced mortalities in toxic diffuse goiter but had little effect on the mortality of thyroidectomy for toxic nodular goiter except in so far as the general reduction in death rate influenced patients to submit to operation before damage was too great. These factors reduced mortality rates after 1923 from somewhere between six to 10 percent down to between one and three percent.

The second epoch in the care of the thyrotoxic patient began with the following: experimental evidence of Mackenzie and Mackenzie[21-22] that sulfaguanidine inhibited the production of thyroxin in the rat; the observations of Kennedy[16] of the goitregenic effect of allylthiourea; experiments of Richter and Clisby[26] on the similar action of phenylthiocarbamide. The evidence was completed by the brilliant experimental and clinical investigations of Astwood[1] on the effectiveness of thiouracil.

When Astwood[2] later introduced propylthiouracil, a drug of lesser toxicity, the use of the antithyroid drugs in preoperative treatment became firmly established although by no means uniformly applied. A discussion of the preparation of a thyrotoxic patient for operation now revolves itself largely around the use of the antithyroid drugs. Hence, a cursory survey of the present status of this problem will be presented under the indicated sub headings

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Choice of Drug For all practical purposes only three drugs need be considered, namely, propylthiouracil, methylthiouracil and thiouracil Of these propylthiouracil is the safest Thiourea,[29] thiobarbital[3,1] and aminothiazole[29,30,3] are much too toxic Thiouracil administration carries a reaction rate of 12 percent or more[28] Barfred reported 61 cases treated with methylthiouracil with a reaction rate of 12 percent and made a collective review of 604 cases in which he found that seven percent had toxic reactions severe enough to discontinue treatment and 11 percent had mild reactions not interfering with therapy This is considerably higher than the three to six percent incidence of reactions following propylthiouracil therapy[4,14,1]

Although propylthiouracil is at present the preferred drug it will undoubtedly be replaced by a better one Stanley and Astwood[7] have tested the relative activities of a number of antithyroid compounds in man by calculating the diminution of the uptake of radioactive iodine in the thyroid and by this method have found a number of compounds of greater potency than propylthiouracil

Their previous methods for the evaluation of the potency of the antithyroid drugs have depended upon the goitregenic action of the drugs in the immature rat—an increase in the weight of the gland plus a depletion of iodine The disadvantage of this method of assay is uncertainty that the results obtained will be applicable to men By this method of assay Astwood found that propylthiouracil was 11 times more active than thiouracil, but by the assay with radioactive iodine in man, he found the two drugs to be of approximately equal potency—a finding more compatible with clinical observation On the other hand, by this method they found several drugs more active than propylthiouracil and one, 2 mercaptoimidazole which had 10 times the potency

Dosage of Propylthiouracil The original dosage of 75 to 150 mg daily recommended by Astwood[7] for reasons stated above have been found to be much too small An excellent analysis of dose has been made by Hibbs and McCullagh[13] They found that in amounts of 150 mg or less per day the drug was ineffective in 42 percent of patients, in amounts of 200 mg daily it was ineffective in 12 6 percent but with 300 mg a day it was ineffective in only 3 7 percent They recommended initial treatment of 300 mg daily as 100 mg three times daily, and do not hesitate to use 500 or 600 mg daily if necessary Most investigators have come to about the same conclusion Most certainly an initial dose of less than 200 mg daily is inadvisable

Reactions The incidence of reactions is no more than five or six percent[2,4,14] They consist of a generalized pruritus or an urticarial rash or even an exfoliative dermatitis, arthralgia, paresthesia of the extremeties, anorexia, nausea and vomiting, fever, leukopenia Cutaneous manifestations are the most frequent but often not severe enough to discontinue treatment entirely Mild degrees of pruritus are of little significance If a rash appears the drug may be discontinued for a few days and when the rash disappears it can be cautiously readministered

Agranulocytosis although uncommon, can not be ignored I have observed two patients with an agranulocytopenia and hyperpyrexia, one in the early weeks of treatment and the other after nine months of continuous therapy It is advisable to do a white blood count weekly and if it falls below 5000 per cm a differential count is mandatory A relative leukopenia is not infrequent but usually a differential count reveals a normal percentage of polymorphonuclear leukocytes

Under such circumstances treatment may be continued but if the patient is in reasonably good condition it is probably less disturbing to all concerned to discontinue the treatment and to do the operation Judging from the reports in the literature and my own experience it can be estimated that two or three patients out of a hundred will be unable to take the drug

Duration of Treatment: Bartels[4] has calculated that under propylthiouracil therapy alone the basal metabolic rate drops 1 3 points a day in toxic diffuse goiter and 64 in toxic nodular goiter Hibbs and McCullagh[13] calculated the fall of the basal metabolic rate in toxic diffuse goiter at 2 95 percent per week

These figures present only a general idea of expected improvement and are not at all reliable in estimating the duration of treatment necessary to return a patient to a euthyroid condition and treatment should, if at all possible, be continued until the patient is quite normal.

The drug is more quickly effective in a patient with a small toxic diffuse goiter and least effective in an elderly individual with a large toxic nodular goiter. In the former instance a normal basal metabolic rate may be obtained in four to eight weeks, in the latter it may require six to nine months. It is unfortunate that its effectiveness is the least where one needs it the most.

The highest surgical risk is in patients past 60 years of age with toxic nodular goiters and it is in exactly these patients that amelioration of symptoms appears so gradually that the surgeon may be tempted (and indeed at times may be forced) to do a thyroidectomy before the patient reaches a euthyroid condition. But if one recognizes beforehand a lengthened duration of preparatory treatment then uses an adequate dose of the drug and exerts some patience and surgical restraint it will be found that practically all patients will ultimately return to normal.

Lahey has called attention to the inadvisability of forcing the patient into a myxedematous state because of the increase in postoperative edema and the possibility of tracheal obstruction. It has been recommended that the drug be discontinued 10 days before operation because of the fear that an agranulocytosis might occur at the time of operation or be induced by the operation. The danger of this complication must be exceedingly small, so small perhaps that it might be disregarded.

Concomitant use of Iodine: Originally thiouracil was administered without iodine but it was soon found that in the diffusely hyperplastic thyroid, friability of the gland made the operation—technically—very difficult. An untreated toxic diffuse goiter is normally friable and vascular; iodine medication reduces the friability and facilitates removal. Thiouracil treated glands seems to be even more friable and vascular than toxic untreated ones. Because of experimental and clinical observations which indicated that the rate of improvement was slowed by previous or concomitant use of iodine, it was recommended that iodine be administered for only the immediate 10 days preceding the operation in order to reduce the degree of friability and in addition prevent the possibility of a crisis.

Further observations indicated that it is better to give the iodine and propylthiouracil simultaneously throughout the period of treatment.[4-13] There is immediate improvement as a result of the iodine followed by the latent effect of the antithyroid drug.

Hibbs and McCullagh[13] have reported a 3.07 percent drop in the basal metabolic rate in toxic diffuse goiter from combined use of propylthiouracil and iodine and a 2.95 percent drop with propylthiouracil alone. From a clinical point of view the combined use of the drugs seems more satisfactory and in addition, the prolonged use of iodine more effectively eliminates the excessive friability. In toxic nodular goiter, however, it is not necessary to administer iodine during the entire preoperative period. It is not particularly effective in reducing the severity of the symptoms in toxic nodular goiter and in addition friability is not a technical problem. Thus in toxic nodular goiter it is perhaps best to give iodine only during the two or three weeks immediately preceding the operation.

Which Patients Should be Prepared with Propylthiouracil? It would be difficult to deny that if a drug can safely return a hyperthyriod patient to a euthyroid condition it should be used in the preoperative preparation of every hyperthyroid patient. The question, of course, arises, "Can this be done safely?" There is every reason to believe that it can. In practice, however, many surgeons for economic reasons find it more convenient to prepare the patients who have mild degrees of hyperthyroidism with iodine therapy alone reserving propylthiouracil treatment for only those with severe degrees of hyperthyroidism. Thus one can find in centers where large number of thyroidectomies are performed that the percent of patients prepared with propylthiouracil varies from 10 percent to a 100 percent. The former figure obtains where most of the patients are from out-of-town and the latter figure where the patients live in the community and are under the care of an internist

There can be no doubt that all sick patients, all patients in whom a higher mortality is expected, should be painstakingly prepared for operation by propylthiouracil The definition of what constitutes a "sick patient" will vary enormously Perhaps it would be better for the occasional operator to consider all hyperthyroid patients as "sick" and permit the more experienced operator to lower his threshold for propylthiouracil therapy as his *experience and capabilities indicate* In this way the mortalities of the two individuals will very likely approximate each other

A higher mortality can be expected in old patients In Table I the mortality rate is calculated by decades in 1092 thyroidectomies for toxic goiter It is seen that though the total mortality is 1 3 percent there was only one death in 511 patients under 40 years of age Judging from these figures, and they are comparable to the experience of others, it would not be unreasonable to insist that all patients at least over 50 years of age, should be prepared with propylthiouracil

Preoperative Regime The vast majority can be treated as office patients Congestive heart failure and crises are practically the only indications for hospitalization Before treatment is instituted a basal metabolic rate, a leukocyte count, and perhaps a differential blood count are made The patient is advised to eat three good meals a day plus additional feedings in the middle of the morning the afternoon and the evening Smoking is prohibited before meals Physical activities are restricted as the general strength of the patient indicates He must be in bed early, preferably by nine o'clock

Propylthiouracil is administered, *300* mg daily, as two 50 mg tablets three times a day If the patient has a toxic diffuse goiter he is given five or 10 drops of Lugol's solution in milk or grapejuice three times a day He is advised to cease taking the propylthiouracil on the appearance of any sort of illness such as sore throat, fever, skin eruption, gastrointestinal symptoms or generalized pruritus and immediately communicate with the doctor Each week a leukocyte count is made and if it drops to 5000 per cm a differential count is made If there is a diminution in the percent of polymorphonuclear leukocytes the *propylthiouracil is discontinued*

At each weekly visit the weight, blood pressure and the pulse rate are accurately recorded From these figures plus the objective observations of general strength and the degree of nervousness and the subjective sensation of the patient it is not difficult to estimate when the patient is euthyroid A final basal metabolic rate confirms it The propylthiouracil may be discontinued a few days before *operation but the iodine is continued* If the patient has a toxic nodular goiter iodine is given only during the last two weeks of preparation If auricular fibrillation is present or if the patient is over 60 years of age—mild digitalization is helpful

Immediate Preoperative Orders. It is well to order a full supper the evening before operation The food in the gastrointestinal tract does not interfere with a neck operation and the patient needs the extra nourishment A small amount of one of the phenobarbiturates such as seconal (100 mg —1½ grains) before bedtime will assure a good night's rest A similar amount two hours before the operation, morphine sulphate (10 mg —⅙ grain) and atropine sulphate (0 5 mg —1/150 grain) 45 minutes before operation will give adequate preoperative sedation if inhalation anesthesia is contemplated

Postoperative Regime Most patients are more comfortable in a semi sitting position Some however acquire a backache from the unaccustomed position and in such a circumstance there is no objection whatever to having the patient lie flat or upon the side Fluids should be started by mouth as soon as tolerated Pain, cough or even vomiting are no contraindication

The administration of intravenous fluids is not mandatory but is advisable Two thousand cubic centimeters, 1000 cc of five percent dextrose in physiological saline solution and 1000 cc of five percent dextrose in distilled water during the first postoperative day is usually adequate Twenty drops of Lugol's solution placed in the intravenous fluid will supply all iodine requirement for the first day and on the next day the patient may begin with 10 drops three times daily by mouth. Morphine sulphate (10 mg.—$\frac{1}{6}$ grain) by hypodermic injection, given freely, will control the pain for the first two days; after that varying doses of codeine and aspirin will suffice.

An oxygen tent is reserved for elderly patients or those who have or have had signs of congestive heart failure. When its use is contemplated it is well to explain the matter to the patient before operation or better still put him in one for a few moments in order to counteract the sense of claustrophobia when he finds himself cooped up in a tent following the operation. If a drain has been placed in the wound it can be removed on the second or third day depending on the amount of drainage or the appearance of the wound.

All sutures or clips must be out in 72 hours. Some patients can get out of bed comfortably and safely on the second day but most of them on the third day. If movement of the neck is encouraged pain and stiffness in the neck, headache and neuralgias are diminished. The average patient leaves the hospital in five, six or seven days. It is imperative that the wound be dressed at least every other day after the patient leaves the hospital.

During the second week, serum frequently collects beneath the scar; it may appear as a small blister or as a soft spot felt along the scar. If one blade of a sharp pointed scissors is inserted in the area a few drops of serous or serosanginuous fluid will exude. If such a collection of serum is not opened, it may extend along the scar spreading apart the edges of the skin. More unsightly scars result from a failure to recognize and puncture these accumulations than result from poor approximation of the skin edges. If the patient had a toxic diffuse goiter the Lugol's solution, five drops twice daily, should be continued for a number of weeks or as long as there are residual symptoms of hyperthyroidism. If the patient had a toxic nodular goiter the iodine is of little value.

Postoperative Complications—"Crisis" or Severe Postoperative Reaction: The term "crisis" or "storm" was used in the past to describe a violent reaction appearing suddenly, usually within 24 hours, and characterized by hyperpyrexia, marked tachycardia, excessive nervousness, delirium and frequently death. Such a reaction is uncommon since the introduction of iodine in the preoperative treatment. The height of the reaction is reached on the second night. The temperature and pulse rate invariably rise on the first evening following operation, drop the following morning, and rise to the highest level on the second night. If, for instance, the temperature is 101° and the pulse rate 110 per minute on the first night they can be estimated at 102° and 130 respectively on the second night. If the temperature rises to 103° the first night, one can expect an additional rise and a troublesome reaction during the second night and thus forewarned, can take anticipatory measures to combat it.

The treatment of a severe postoperative reaction is essentially the same as the routine postoperative treatment, namely, fluids, food, iodine and morphine. Cool sponges, baths, and ice bags help to bring down the temperature. An oxygen tent is usually indicated. Digitalis helps to diminish the deficit in auricular fibrillation. More important is adequate nursing service with special nurses. The inevitable severe reactions occurring in the past should now be exceedingly rare and indeed should be looked upon as prima facie evidence of poor preoperative care or judgment. In elderly people a different type of reaction may occur. In it, the patient without much elevation of pulse rate or temperature, gradually becomes more and more mentally confused, develops mucous and cough, goes into a muttering delirium and dies in a few days with a terminal hyperpyrexia.

Postoperative hemorrhage manifests itself in the following two ways:

1. One of the main vessels breaks loose, the neck suddenly distends, blood pours out through the wound, breathing rapidly becomes impossible and the patient promptly dies unless help is near at hand. The wound should immediately be opened by any means and on the spot. If the carotid is firmly compressed in its midportion, first on one side and then the other, the side from which the bleeding arises can be recognized. Pressure is maintained until additional help arrives and the vessel can be localized.
2. The bleeding is of more gradual origin arising from a small artery or an open vein.

The typical history is about as follows On the evening of the first day the patient complains that the bandage is tight and that he has much difficulty in swallowing Fluids "go down the wrong way" and strangle him The complaints are common enough and little attention may be paid to them unless the blood has oozed to the exterior and saturated the dressings If the blood collects in the neck without appearing externally, which it not infrequently does the wound very likely will not be uncovered As the hours pass a slight *inspiratory stridor* is heard If the patient is asked to open his mouth and take a quick deep breath and a noisy inspiration results one can rest assured that trouble is at hand If nothing is done by the early hours of the morning a loud stridor accompanies each inspiration and breathing is so impaired that cyanosis supervenes Some of the obstruction is due to direct pressure of the blood clots on the windpipe and some of it to the ever present edema secondary to the pressure If the surgeon waits too long he may find to his chagrin that when the wound is opened and the clots removed the obstruction is not relieved When blood collects beneath the deep fascia it causes a diffuse cylindrical swelling of the entire neck There is edema even up along the borders of the jaw In most instances it is accompanied by ecchymosis and there is also more than the usual amount of blood upon the dressings If there is the slightest evidence of tracheal obstruction the patient should be taken to a fully manned operating room and the wound opened without anesthesia The operation is not an easy one Frequently the bleeding point cannot be isolated and it will be necessary merely to pack the wound and leave it open

Obstructive dyspnea has three causes (1) hemorrhage (2) recurrent laryngeal paralysis and (3) edema Collapsed trachea as a cause of obstruction is probably nonexistent [10, 11] Hemorrhage has been discussed above In bilateral recurrent laryngeal paralysis an inspiratory stridor sometimes barely noticeable and sometimes severe enough to demand a tracheotomy, appears at the time of operation The vocal cords are in the cadaveric or elliptical position The voice is hoarse yet the space is large enough for ordinary breathing However it is easily obliterated by swelling and edema

A laryngologist can usually visualize the cords even under the adverse circumstances accompanying a bilateral paralysis most of us cannot An excellent method to check the cords is to have the anesthesiologist examine them by direct laryngoscopy after the removal of the first lobe and again after removal of the second lobe This probably also constitutes the most foolproof method of avoiding a bilateral paralysis Isolating the nerve as recommended by Lahey[18] *is helpful in recognizing* the anatomical position of the nerve but is practically impossible in the technically difficult thyroidectomies and does not prevent injury to the nerve cephalad to the inferior thyroid artery

Edema as the sole cause of obstruction is not common—it is more commonly secondary to a large blood clot Edema and some obstruction invariably occurs in acromegaly, it is common in myxedema and is more likely in a man with a short stout neck and in patients with a compressed windpipe The swelling of the neck is indistinguishable from that produced by bleeding

In any type of obstruction the patient should be immediately placed in an oxygen tent On normal inspiration the bronchi are dilated by the negative pressure exerted by the increase in the size of the pleural cavity but there is negative pressure in the tracheal lumen which diminishes its caliber When there is obstruction there is an increase in inspiratory effort, the negative pressure in the trachea is increased the cylinder is constricted the constriction further increases the obstruction As the effort to breath becomes greater the increasing negative pressure produces an increasing collapse of the laryngeotracheal cylinder until finally often rather suddenly and unexpectedly the obstruction is completed and the persistent distal negative pressure maintains it

If the patient is given oxygen not only is oxygenation of the lung enhanced but the effort to breathe is lessened and the obstruction is actually relieved Because of the suddenness of complete obstruction a tracheotomy set should be in the room and a nurse in constant attendance In the presence of

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—952 operations with 38 deaths, McQuillan and Breedenbach[24]—1000 operations with 20 deaths, Young[30]—2933 operations with 54 deaths, Seed—1092 operations with 14 deaths.

These were collected from surgeons especially interested in goiters, from charity hospitals in which mortalities are much higher, from one or more entire hospitals, or an entire community. The above 8756 operations for thyrotoxicosis total 193 deaths—a mortality of 2.2 percent. This probably represents a fair general average of mortality throughout the country.

TABLE 1

OPERATIVE DEATH RATE IN TOXIC GOITER BY DECADES

Age	Number Cases	Number Deaths	Percent Deaths
10-19	49	0	0.2
20-29	187	1	
30-39	275	0	
40-49	291	4	1.3
50-59	190	4	2.1
60-69	90	3	3.3
70	10	2	20.0
	1092	14	1.3

The stated causes of death can be gathered into three groups:

1. "Medical deaths"—deaths due to thyrotoxicosis or to heart failure presumably the result of thyrotoxicosis—97; pneumonia—15; total 112.

2. Deaths presumably due to technical or anesthetic errors—obstructive dyspnea—18; hemorrhage—7; shock—4; on the operating table—6; tetany—1; sepsis—1; total 37.

3. Miscellaneous—emboli—21; more or less unrelated cardiac disease—15; abortion—1; drug reactions—4; gas gangrene—1; infectious hepatitis—1; pancreatitis—1; total 44.

The first group of so-called "medical" deaths—constituting 59 percent of all deaths, at present are in a large measure avoidable. The second group of "technical" deaths, 19 percent, are also avoidable, much the more so now in that speed of operation is less important for recovery and more time and more care can be exerted during the procedure. Of the third group of miscellaneous deaths, 22 percent of the total, embolism probably due to mural thrombi secondary to auricular fibrillation leads the list with heart failure a close second These deaths are largely unavoidable. Under ideal care the mortality, then, for thyroidectomy for toxic goiter should be about one death in 200 operations. It can be seen that the greatest reduction in the death rate can be accomplished by proper preoperative preparation and a lesser reduction by greater attention to the details of the operation itself.

SUMMARY

Most patients with thyrotoxicosis should be prepared for operation with propylthiouracil. The initial dose is 300 mg. daily. In toxic diffuse or exophthalmic goiter iodine is given concomitantly; in toxic nodular goiter only during the last two weeks of preparation. The white blood count is checked at weekly intervals Treatment is continued until the basal metabolic rate is normal or nearly normal. The propylthiouracil is discontinued a few days before operation.

The routine postoperative treatment consists essentially of administering iodine, maintaining an adequate fluid and food intake, and controlling pain. Postoperative hemorrhage may occur as a collection of blood in the neck without external bleeding and be evidenced principally by difficulty in breathing. Obstructive dyspnea is due to (1) hemorrhage, (2) recurrent laryngeal paralysis, (3) edema If the patient is hyperthyroid at the time of operation it must be relieved early.

The other complications peculiar to a thyroidectomy, namely, crises, parathyroid tetany, auricular fibrillation, cough and mucous, are discussed. About three-fifths of the postoperative deaths are due to the thyrotoxicosis in itself. Technical errors account for about one-fifth, a miscellaneous and largely unavoidable group accounts for the remaining fifth. With adequate preparation by propylthiouracil a normal patient can be delivered to the operating room and the operative procedure can be performed with more care and less speed. If this is done most of the causes of death can be eliminated leaving an unavoidable death rate of perhaps one-half of one percent.

RIASSUNTO

La maggioranza dei pazienti affetti da tireotossicosi dovrebbe essere sottoposta ad una cura preoperatoria con propiltiouracile, iniziandola con una dose giornaliera di 300 mg. Negli strumi tossici diffusi e nei gozzi esoftalmici l'iodio va somministrato contemporaneamente al tiouracile: negli strumi tossici nodulari solamente nelle due settimane precedenti l'operazione. Il conteggio dei globuli bianchi va fatto ogni settimana. La somministrazione di tiouracile va continuata fino a che il ricambio basale diventa normale o quasi: va sospesa pochi giorni prima dell'-operazione. Dopo l'intervento, la somministrazione di liquidi e di cibi va mantenuta adeguata: i dolori vanno controllati: l'iodio somministrato. Un'emorragia postoperatoria puo' insorgere, provocando uno stravaso di sangue nel collo, con difficolta' alla respirazione. Dispnea da ostruzione e' dovuta essenzialmente ad (1) emorragia (2) paralisi ricorrente della laringe (3) edema.

L'A. discute altre complicazioni comuni alla tiroidectomia, e cioe'; crisi tireotossiche, tetania paratiroidea, fibrillazione auricolare, tosse. Nei 3/5 dei casi l'esito letale e' attribuibile alla stessa tireotossicosi. Errori tecnici contribuiscono no ad un altro quinto: nel rimanente dei casi la morte e' dovuta a cause varie, spesso inevitabili. Con un'adeguata preparazione con tiouracile i pazienti raggiungono la sala operatoria in condizioni normali, di modo che l'operazione puo' essere eseguita con minore fretta e quindi con maggiore accuratezza. La mortalita' operatoria ha gia' subito una notevole diminuzione: potra' essere ancora ridotta al 0.05%.

SUMARIO

La gran mayoria de los casos de tirotoxicosis se debe de preparar por la administracion previa de la propiltiouracila. La dosis inicial es de 300 mgms al dia. En los casos con exoftalmo o de glandulas de hiperplasia difusa y toxica se administra conjuntamente el yodo.

En los casos toxicos nodulares el yodo se usa en las ultimas dos semanas del periodo pre-operatorio. El tratamiento pre-operatorio se continua hasta que el metabolismo es normal. El propiltiouracil se suspende por unos cuantos dias antes de la operacion.

El tratamiento post-operatorio consiste de la administracion del yodo, nutricion adecuada y el control del dolor. La hemorragia post-operatoria puede ocurrir como una coleccion de sangre en la region del cuello, sin evidencia de hemorragia externa y con dispnea.

La disnea por obstruccion se debe a (1) hemorragia, (2) la paralisis del nervio laringeo inferior, (3) el edema. Esta disnea se debe de corregir lo mas pronto posible especialmente si el paciente fue operado enurante el estado de toxicosis.

Tambien se han discutido las otras complicaciones de la tiroidectomia, tal como las crisis toxicas, el tetano paratiroideo, la fibrilacion auricular, la toz etc. Casi dos tercios de los pacientes que sucumben la causa principal es la tirotoxicosis. Errores de tecnica operatoria son responsable por un 20% de las fatalidades. Con la preparacion adecuada por la propiltiouracil, el paciente esta en condiciones casi normales y por lotanto permite al cirujano el tomar mas tiempo en la operacion evitando asi los errores tecnicos que resultan del apuro. Cuando se eliminan todas estas causa la mortalidad vaja a menos de 0.5%.

SOMMAIRE

La plurat des malades souffrant de thyrotoxicose sont préparés pour l'opération par l'emploi du propylthiouracile. La dose journaliére initiale est de 300 mg. Dans le goître exophtalmique et dans le goître toxique diffus, l'iode est employé en méme temps. Dans le cas de goître nodulaire toxique, on l'emploi seulement dans les deux semaines qui précèdent l'opération. A intervalles hebdomadaires, le compte des globules blancs sanguins est observé. Le traitement est continué jusqu'a ce qu'on ait obtenu un métabolisme basal normal ou presque normal. On discontinue le propylthiouracile quelques jours avant l'opération. Le traitement postopératoire habituel consiste essentiellement de l'administration de l'iode, du maintien adéquat de fluide et du contrôle de la douleur. L'hémorragie postopératoire peut survenir comme collection de sang dans le cou sans hémorragie externe

et se manifeste principalement par une respiration difficile

La dyspnée obstructive est dûe

1 À hémorragie

2 À la paralysie du nerf laryngéal

3 À l'œdème

Si le malade est hyperthyroidique au temps de l'opération la dyspnée doit être soulagée sans délai

Les autres complications qui peuvent survenir après la thyroidectomie, sont crises tetanieparathyroidiennes, toux et production excessive de mucus et sont discutées A peu près 3/5ème des cas de décès postopératoires sont dûs a la thyrotoxicose même Des erreurs techniques sont responsables pour le 1/5ème et un groupe de conditions divers inévitables représente l'autre 1/5ème

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General Surgery

The Surgical Management of Chronic Ulcerative Colitis*

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AS ONE reviews the available literature pertaining to the management of chronic ulcerative colitis, much confusion becomes manifest in that no definite procedure is universally applicable for all cases. Because of this flexibility the rationale of its management—medical or surgical—continues to remain a moot question.

The treatment of chronic ulcerative colitis is essentially a medical problem, yet it is conceded that for patients who do not respond to a precise medical regime and for those who develop complications, surgical intervention is definitely indicated. Streicher[1] has calculated that 20 percent of patients suffering with this disease will be cured by medical management; 60 percent will show improvement with periods of exacerbation and remission, and 20 percent will result in total failure. Surgery ceases to be considered the last desperate effort to prevent fatal disaster. However, it is recognized as a means of preserving life in the presence of acute sepsis and to rehabilitate those in a state of chronic invalidism. As Kiefer and Jordan[2] have stated, "the medical treatment of chronic, idiopathic ulcerative colitis must be regarded as a control and not a cure—complete colectomy is the only actual cure of chronic ulcerative colitis now available." While we do not hold with this statement in its entirety, it is conceded that the results acclaimed from a strictly medical regime are most discouraging.

The most widely used surgical procedure is ileostomy, performed either as a palliative maneuver or as a preliminary step to resection. Appendicostomy and cecostomy have their proponents as well, although in our experience, both are inferior to ileostomy since, in so many instances, the cecum and distal ileum are involved.

Transversostomy may be well chosen in those cases where the disease is confined to the left colon and rectum. The indications for ileostomy may be enumerated as follows: sepsis not amenable to rigid medical regime, remissions and exacerbations of the disease, uncontrollable diarrhea, impending perforation and chronic malnutrition or anemia. Jordan and Bargen both postulate that ileostomy should be reserved for the complications and those intractable cases where at least two or three flare-ups of the disease have already been dealt with medically without appreciable benefit. We cannot concur with the opinion of Marachella that surgical intervention admits defeat and should be postponed until all trial and error methods have been exhausted, which leaves the patient in a deplorable physical state in the vast majority of instances.

Ileostomy as an emergency procedure carries with it a high mortality, 53 percent in the series reported by Cave,[3] and 75 percent reported by Cattell.[4] Such can readily be appreciated because these patients are usually too ill to withstand any type of surgery. Peritonitis should not be considered an indication for ileostomy. Whether or not hemorrhage warrants ileostomy is open to question since we all have experienced at least one instance where failure has occurred. Ileostomy as an elective procedure offers a low mortality (6 to 9 percent).[3,4] It is to be emphasized that the disease should never be permitted to progress beyond a point where, in the opinion of both the surgeon and the internist, the patient becomes a poor surgical risk. An ileostomy may be established as either a temporary or permanent procedure. Large groups of cases are not available from which one may deduce

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* Read before the Piemontese Surgical Society, Turin, Italy, May 28, 1948.

From the Department of Proctology, Temple University Medical School, Philadelphia, Pa whether subsequent closure can be satisfactorily effected According to the few reported at hand, approximately two thirds can be so treated Crohn[5] never advises closure once it is made, but considers it an initial step to resection

One must be ever mindful of the complications associated with ileostomy among which may be mentioned retraction, contraction or *prolapse of the stoma, obstruction, perforation*, volvulus abscess and fistulae in the abdominal wall around the stoma, repeated collapse from sudden salt deprivation as a result of abrupt and profuse diarrhea, skin irritation, urinary complications and anemia

Vagotomy which has been employed in the treatment of duodenal ulcer has been performed by Dennis[6] in cases of this disease Based on the demonstration that postganglionic sympathectomy in dogs was followed by lesions suggesting clinical colitis in man, and on the marked relief of gastrointestinal spasm following division of the vagi for duodenal ulcer, this investigator recently reported his experiences with vagotomy in twenty two cases of idiopathic ulcerative colitis and in one case of functional diarrhea Gastrointestinal studies following vagotomy revealed marked slowing in gastric emptying Prolongation of intestinal transit even when gastric emptying began *immediately*, was shown Dennis mentions that the best clinical results followed vagotomy in cases of short duration or with mild demonstrable fibrosis

Colectomy has been popularized during the past few years and while the procedure is a formidable one, it is surprising to observe how well patients tolerate extensive resection with present day management Patients for whom an ileostomy has been established and who present signs and symptoms of persistent sepsis, extensive scarring of the bowel, fibrous stricture, pseudopolypoid and malignant degeneration, as well as arthritic change, should be colectomized The operation may be performed as a single stage or multiple stage procedure Ordinarily, an ileostomy is made as the initial step and, following a varying period of time, the right, transverse, and left colon are removed Thereafter, the rectum and lower sigmoid are excised by an abdominoperineal maneuver

While complete colectomy is usually indicated, there are many instances where partial colectomy or segmental resection can be satisfactorily performed Ileosigmoidostomy and ileorectostomy are frequently recommended either as a delibrate therapeutic approach, or as a preliminary to colectomy To this, the authors cannot subscribe since the percentage of patients who are free and remain free of *disease in the rectum and sigmoid are* extremely few

It is recognized that this disease begins in the rectum and sigmoid in more than 90 per cent of all cases This is confirmed by Bargen and others In Jordan's series of 430 patients with chronic ulcerative colitis, the rectum was involved in 407 or 94 percent It is, therefore, our frank opinion that the rectum should be extirpated except in the very exceptional case

Some mention should be made pertinent to transplantation of an ileostomy to the anus with sphincter preservation following colectomy Rudolph Nissen,[7] [8] formerly of Istanbul, reported such a procedure in 1933 for multiple polyposis Ravitch recorded his experiments on dogs in 1947,[9] and this year cited his experience with ingenious modifications in five patients with chronic ulcerative colitis[10] Ravitch states that neither incontinence nor *excoriation of the anal skin* has been a problem and that complete sphincter continence and good sphincter tone are gradually regained after operation Wangensteen did employ this method in two instances but because of skin excoriation was compelled to replace the ileum to the abdomen Babcock similarly performed this procedure in three instances of ulcerative colitis and for the same reason returned the ileal stoma to the abdomen in two Payne and Hay each had one case in which replacement to the abdomen was necessitated by marked degree of excoriation

In the presence of impending perforation, ileostomy may be well chosen On the other hand, in peritonitis, it is probably better to employ "watchful waiting' with antibiotic and chemotherapeutic measures Obstruction calls for surgical decompression, while stricture, pseudopolyposis and malignant degeneration demand colectomy

Anorectal abscesses occurring during the course of the disease require incision and drainage, but correction of other pathology, such as hemorrhoids should ordinarily be treated conservatively.

Our experience has been particularly limited. Of the ileostomies performed, either as an emergency or elective procedure, the mortality rate has been 21 percent.

There were, however, twelve colectomies, either total or partial, without death; with the exception of one, the rectum had been removed. The following tabulation shows the cases reported by various surgeons:

Author	Cases of Ileostomy	Mortality	Cases of Ileosigmoidostomy	Cases of Colectomy	Mortality
Cave	65	18.0%	11	55	10.9%
Cattell	83	14.5%	—	54	20.0%
Garlock	15	13.3%	6	16	18.7%
Garlock	38	15.7%	21	46	10.8%
Bargen & Pemberton.	130	26.9%	20	30	36.3%
McKittrick	54	27.7%	—	10	10.0%
Lemmer	17	23.5%	4	11	18.0%
Rankin	26	31.7%	—	—	—
Ferguson	14	?	—	9	14.2%
Best	8	12.5%	—	—	—
Ault	—	—	—	13	15.3%
Wangensteen	—	—	—	13	none
Bacon	19	21.0%	—	14	none

SUMMARY

Customarily all of our patients are placed on a rigid medical regime which briefly includes individualized diet, adequate vitamins, transfusions of blood and plasma with regular frequency and in small amounts, parenteral administration of protein derivatives, and sulfathalidine alternating with neoprontosil. At no time have we ever hesitated to employ anti-amebicides such as emetine, even though repeated mucosal scrapings and stool specimens are negative for the parasite. Where severe exacerbations and remissions of the disease have occurred on two or three occasions, surgical intervention is indicated. Ordinarily, a preliminary ileostomy is established and subsequent colectomy, provided the case conforms to its indications as previously outlined. Removal of the rectum, in our experience, has been required as the final step.

RIASSUNTO

I pazienti vengono ordinariamente sottoposti ad un regime medico rigoroso, il quale include: una dieta selezionata; la somministrazione di una quantita' adeguata di vitamine; piccole, ripetute trasfusioni di sangue e di plasma; somministrazione parenterale di derivati di proteine; sulfaptalidina alternata con neoprontosil. Anche allorquando l'esame batteriologico e' riuscito negativo, antiamebici sono stati frequentemente usati. La cura medica e' stata sostituita dalla cura chirurgica allorquando la colite si e' esacerbata per due o tre volte. Quando indicata, una colectomia e' stata eseguita dopo un'ileostomia preliminare. L'escisione del retto e' generalmente richiesta quale ultima tappa operatoria.

SUMARIO

Generalmente nuestros pacientes son sometidos a un regimen medico estricto que consiste de una dieta individualizada, rica en vitaminas, de transfuciones de sangre o de plasma en pequenas cantidades y que se repiten con regular frecuencia; infuciones intravenosas de derivados proteicos, y la administracion oral de la sulfatalidina alternandose con la neo-prontosila. En casos dudosos se usan los amebicidas, tal como la emetina, aunque el examen repetido del excremento sea negativo. En casos de recurrencia seria la intervencion quirurjica es indicada. Ordinaria-

mente se hace una ileostomia preliminar y despues se practica la colectomia, siempre y cuando esta sea indicada En nuestra experiencia la reseccion del recto es un paso final

SOMMAIRE

Nous mettons nos malades sous un régime sévère qui comprend une diete individualisée, des vitamines en quantité adéquate, des transfusions de sang et de plasma a intervalles réguliers et en petites quantités, de l'administration parentérale de dérivés de protéines, et aussi en ingestions de sulfathalidines alternant avec la néoprontosile Nous n'avons jamais hésité de nous servir d'anti amibicides telle que l'emétine, même si le curettage de la muqueuse et les échantillons des fèces ne demontrèrent pas la présence de parasites En présence de récidives des symptomes et de rémissions, répétées l'intervention chirurgicale est pratiquée

Ordinairement, nous faisons une iléostomie préliminaire et, si les indications sont conformes, suivie de colectomie Si l'etat du malade l'exige, nous enlevons le rectum Dans notre expérience, cela fut nécessaire dans plusieurs cas

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Radical Amputation for Cancer of the Breast With and Without Irradiation

A Statistical Study*

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A GREAT many studies have been reported, relating to the surgical treatment of breast carcinoma, dealing with the work of one surgeon or one clinic. This paper deals with 1212 radical amputations of the breast, performed by many surgeons working in four Minneapolis hospitals.

The records of these hospitals for the past 20 years were used for this statistical report. The four hospitals have a bed capacity of 1475 and yearly admissions of 34,770.

The main considerations in this paper are: the clinical stage of the disease at operation; the five year survivals resulting from surgery, with and without irradiation; and a comparison between the large and small tumors.

The entire report is concerned with the results of treatment and not its technique.

Table 1a and 1b contain some important statistics relating to the patients at the time of operation and also some information concerning the postoperative period. They show that 61.7 percent of the tumors were reported Scirrhus, 8.8 percent Adenocarcinoma, 6.8 percent Medullary and 22 percent Unclassified.

The youngest patient was 17, and the oldest patient was 93, with an average age of 53 years. The highest age incidence was in the fifth and sixth decades.

Of the 89 percent which were married, 65 percent had borne children. The single group totaled 11 percent.

A family history of cancer was obtained in a little over a fourth of the cases, with six percent reporting Trauma and five and one-half percent with previous diseases of the breast.

The average age for beginning menopause was 45 years. Tumor duration at the date of operation, ranged from a very short time to many years, with an average of 13½ months. Pain of different types and degrees was complained of by more than half of the patients.

Five percent of the group had some discharge from the nipple, described as bloody, watery, or containing pus.

The tumors were equally divided between the two breasts—45½ percent were located in the upper, outer quadrants.

Regional metastases were found in more than half of the patients—mostly axillary. Remote metastases appeared postoperatively in 47 percent of the cases in the following locations: spine, pelvis, ribs, liver, brain, ovaries, mediastinum, lungs, pleura, pancreas, rectum, uterus, glands and generalized metastases. A total of 10 percent of the cases had recurrence of the growth in the scar.

The 1212 cases were classified into two clinical stages. Stage one included the group in which the tumor was confined to the breast. This numbered 584 cases. Stage two contained those cases where both the breast and axilla were involved and where there was to a limited extent, adherence of the tumor to the skin, nipple retraction or elevation, or fixation to the underlying muscle. This stage numbered 628 cases.

Table 2 shows the five year survival rates according to stage.

Only those patients operated upon five or more years previous to the date of inquiry—which was January 1, 1948—were eligible. This group numbered 1060. However, only 951 could be traced for five or more years—456 of these being in stage one and 495 in stage two. This tracing was done through letters to the patients themselves, to their relatives, through hospitals, doctors, use of city directories, and through city and state departments of health.

The five year survival rates were figured

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* Presented at the Thirteenth Annual Assembly of the United States Chapter of the International College of Surgeons, St. Louis Nov. 15-20, 1948

TABLE 1a

Total Cases	Classification		Age Incidence		Marital Status		Family History of Cancer	Trauma	Previous Disease of Breast
No.	Types	%	Age Groups	%	% of Married	% of Single	%	%	%
1212	Scirrhus	61.7	17—24 yrs	.05	89	11	27	6	5.5
	Adeno	8.8	25—29 yrs.	1.34					
	Medullary	6.8	30—39 yrs.	11.8					
	Paget's	.05	40—49 yrs.	26.9					
	Ca Unclass.	22.0	50—59 yrs.	27.4					
			60—69 yrs	22.2					
			70—79 yrs.	8.7					
			80—93 yrs.	1.3					

Statistical information relating to the 1212 cases in the series.

TABLE 1b

Age at Beginning Menopause	Duration of the Tumor at Operation	Pain was Present	Discharge from the Nipple	Location of the Tumor		Metastases Present		Recurrence in the Scar
		%	%	Site	%	% of Regional	% of Remote	%
45 yrs.	13½ Mo.	55	5	Upper outer Quadrant	45.5	51.8	47	10
				Lower outer Quadrant	12			
				Inner upper Quadrant	10			
				Inner lower Quadrant	6.5			
				Central Zone	12			
				Upper half	7			
				Lower half	7			

as the ratio in percent of those patients who lived five or more years after operation, to the number of traced patients in that particular stage.

It was found that 70.3 percent in stage one had survived for five or more years—almost double that of stage two, which was only 38.7 percent *A total of 513 patients survived for five or more years*, which was more than half of the 951 traced patients.

Table 3 shows the survival rates according to stage, for five, 10, 15, 20 and more year survivals

This table shows that 62.6 percent of the stage one, five or more year survivals, actually lived for five to nine years inclusive, and 68.7 percent in stage two lived for the same length of time. This five to nine year group *has a much higher percent of five year survivals* than any other group. The percent of survivals in each of the groups becomes increasingly less, with increased length of survival. It is interesting to note that the percent of survivals is higher for the stage one patients —with the exception of the five to nine year group.

Table 4 is a study of the 951 patients, traced and eligible for five year survival, grouped according to the size of the tumor. This was to discover, if possible, whether or not the size affected the survival rates. Patients with tumors of two centimeters or less in diameter, were put into one group and those of more than two centimeters, in another.

Small tumors numbered 250, while 701 were large. In stage one, 77.3 percent of the patients with small tumors attained five year survival and only 63 percent of those with large tumors. This shows that those patients with small tumors, had a 14 percent higher survival rate.

In stage two, only 46 percent of the patients with small tumors, reached five year survival —much less than in stage one. Only 37 percent of those with large tumors in stage two, survived for five years.

This table seems to indicate that patients with small tumors, have a much greater chance for five year survival.

Table 5 groups the five or more year survivals, according to the duration of the tumor at operation and according to the size. This was to see whether a difference in the length of the tumor duration in the small and large

TABLE 2. FIVE YEAR SURVIVAL RATES ACCORDING TO STAGE

	Patients Operated Upon				Lived 5 or more years after Operation	
	Total	Eligible* for Study	Traced* Patients Number	Percent of Traced Patients	Number	Percent of Traced Patients
Stage I	584	518	456	88	321	70.3
Stage II	628	542	495	91.3	192	38.7
Summary	1212	1060	951	89.7	513	53.9

* Inquiry as of January 1, 1948. Included here are only those patients operated on five or more years prior to the date of inquiry, i.e., 1942 or earlier, and only those that were traced.

TABLE 3. FIVE, 10, 15, 20 AND MORE YEAR SURVIVALS—ACCORDING TO STAGE

	Total Patients Operated Upon, who lived 5 or more years after Operation*								
	Number	Lived 5 to 9 yrs. inclusive	%	Lived 10 to 14 yrs. inclusive	%	Lived 15 to 19 yrs. inclusive	%	Lived 20 or more yrs. inclusive	%
Stage I	321	201	62.6	78	24.3	31	9.6	11	3.4
Stage II	192	132	68.7	40	20.8	18	9.3	2	1.0
Summary	513	333	64.9	118	23.0	49	7.5	13	2.5

Inquiry as of January 1, 1948. Included here are only those patients who were operated upon in 1942 or earlier, who lived for five or more years after operation and who were traced.

TABLE 4. FIVE YEAR SURVIVAL RATES ACCORDING TO THE SIZE OF THE TUMOR

	Eligible and Traced Patients*	Patients with tumors 2 cm or less in diameter, who were eligible for 5 year Survival			Patients with tumors over 2 cm in diameter, who were eligible for 5 year Survival		
		Number	Number of Survivals	Percent of 5 year Survivals	Number	Number of Survivals	Percent of 5 year Survivals
Stage I	456	159	123	77.3	297	198	63
Stage II	495	91	42	46.0	404	150	37
Summary	951*	250	165	66.0	701	348	49.6

* Only 951 of the total 1212 patients operated upon, were eligible and traced for five year survival.

TABLE 5. FIVE YEAR SURVIVAL RATES ACCORDING TO THE DURATION OF THE TUMOR AND ACCORDING TO THE SIZE

			Tumor Duration in 5 Year Survivals							
Size of Tumor	Stage	5 Year Survivals	1 day to 5 mo., inclusive		6 to 12 mo. inclusive		13 mo. to 2 yrs. inclusive		Over 2 yrs.	
		No.	No.	%	No.	%	No.	%	No.	%
Small Tumors	I & II	144	78	54.1	39	27.0	13	9.0	14	9.7
Large Tumors	I & II	299	138	46.1	83	27.7	36	12.0	42	14.0
Summary	I & II	443*	216	48.7	122	27.5	49	11.0	56	12.6

* Only 443 of the 513, five or more year survivals, reported their tumor duration at operation.

tumors, made any difference in the number of five year survivals.

Only 443 of the 513 five year survivals reported their tumor duration at operation.

The one day to five months group in both the small and large tumors contained the largest percent of five year survivals. The other duration groups showed a decrease in the percent of survivals as the length of the tumor duration increased—with the exception of the *over two year group*.

Table 6 is a comparison of five year survival rates of those patients who had irradiation and those who did not. The group of irradiated patients included those who had radium, x-ray or both—preoperatively, operatively or postoperatively.

More than half of the patients in stage one

TABLE 6. FIVE YEAR SURVIVAL RATES ACCORDING TO STAGE AND IRRADIATION

	Eligible and Traced Patients	Patients who had Irradiation				Eligible and Traced Patients	Patients who did *not* have Irradiation			
				Patients who lived 5 or more years after Operation					Patients who lived 5 or more years after Operation	
	No.	No.	%	No.	%	No.	No.	%	No.	%
Stage I	456	253	55.5	178	70.3	456	203	44.5	143	70.4
Stage II	495	341	68.8	129	37.8	495	154	31.1	63	40.8
Summary	951*	594	62.4	307	51.6	951	357	37.5	206	57.8

* Inquiry as of January 1, 1948. Included here, are the 951 patients who were operated upon five or more years previous to this date, and so were eligible for five years survival study.

TABLE 7. FIVE YEAR SURVIVAL RATES ACCORDING TO STAGE, SIZE OF TUMOR AND IRRADIATION

	Irradiation in 5 Year Survivals						Non-Irradiation in 5 Year Survivals					
	5 Year Survivals		Size of Tumor				5 Year Survivals		Size of Tumor			
	No.	%	Small	%	Large	%	No.	%	Small	%	Large	%
Stage I	178	70.3	59	33.1	119	66.8	143	70.4	64	44.7	79	55.2
Stage II	129	37.8	24	18.6	105	81.3	63	40.8	18	28.5	45	71.4
Summary	307*	51.6	83	27.0	224	73.0	206*	57.7	82	39.8	124	60.1

* See Table 6.

TABLE 8. STATUS OF THE 1212 CASES IN THE SERIES ON JANUARY 1, 1948

	Total Operated Patients	Total Traced Patients 1-1-48	Patients Alive on January 1, 1948				Patients Dead on January 1, 1948			
			Without the Disease	With the Disease	Total Alive 1-1-48	% Alive 1-1-48	Without the Disease	With the Disease	Total Dead 1-1-48	% Dead 1-1-48
	Number	Number	No.	No.	No.		No.	No.	No.	
Stage I	584	523	241	6	247	47.2	63	213	276	52.7
Stage II	628	569	126	2	128	22.5	67	374	441	77.5
Summary	1212	1092	367	8	375	34.3	130	587	717	65.6

—55½ percent—had irradiation, while 44½ percent did not The result was that 178 of the irradiated patients in stage one, lived for 5 or more years Their survival rate was 70 3 percent

The 143 of the stage one non irradiated patients, also lived for five or more years, with a survival rate of 70 4 percent So, the survival rates for this stage were practically the same whether the patients had irradiation or not

For stage two patients, almost the same situation holds for 37 8 percent of the irradiated patients survived for five or more years and 40 8 percent of the non irradiated

According to *this* study, irradiation makes very little difference in the survival rate

Table 7 is a comparison of five year survival rates, to learn whether the size of the tumor—both with and without irradiation—made any difference in the survival rates

This table shows that a much greater percent of the tumors in the five year survivals —both irradiated and non irradiated—were large tumors, over two centimeters in diameter, that the small tumors in stage one—both irradiated and non irradiated—produced higher survival rates than those in stage two, that the large irradiated tumors of both stages, produced higher survival rates than the non irradiated This last would seem to prove that irradiation is especially beneficial for large tumors of both stages

Table 8 shows the present status of the 1212 cases in the series

On January 1, 1948, 1092 of the 1212 patients were traced On that date, 47 2 percent of the stage one patients, were alive and 52 7 percent were dead Of the stage two patients 22½ percent were also alive on that date and 77½ percent were dead

A total of 717 patients were dead—587 having died of the disease Of the total dead, 36 percent had lived from five to 22 years postoperatively, with an average of seven and one half years each On January 1, 375 patients were living which is more than a third of the total traced patients Some of them had lived for more than 20 years after surgery

SUMMARY

1212 radical amputations for breast cancer, performed by many surgeons in four hospitals, are studied from a statistical standpoint

The cases are divided into two clinical stages at operation, depending upon whether the tumor is confined to the breast, or metastasis has taken place

The traced patients, eligible for five year survival, numbering 951, are studied to learn the survival rates This is found to be higher for stage one than for stage two patients

The cases are grouped to learn whether the duration of the tumor, the size or irradiation, makes any difference in the survival rates

The final outcome for the total number of 1092 traced patients, is studied to ascertain how many are alive on January 1, 1948 The percent of the dead who died of the disease is especially noted

CONCLUSION

When treatment for breast cancer is carried out while the disease is confined to the breast —clinical stage one—better results are obtained than after it has spread beyond the breast—clinical stage two

Patients with tumors of short duration have a better chance for five or more years survival than those with long duration

Irradiation does not appreciably increase the number of five year survivals in either clinical stage one or stage two However, irradiation of large tumor patients of both stages appears to be of great benefit

Radical amputation for breast carcinoma with irradiation for the large tumors in both clinical stage one and stage two appears to be the treatment of choice, according to this study

The age of greatest breast cancer incidence is in the fifth and sixth decades However, women of all ages should examine their breasts frequently and have their doctor do so every six months They should be made aware of the fact that breast cancer discovered early and treated early, has the more favorable prognosis

RIASSUNTO

L'A afferma ancora una volta che i risultati operatori sono migliori allorquando il tumore e' encora limitato alla mammella e sviluppato da non troppo tempo La terapia attinica non

eleva apprezzabilmente la percentuale di sopravvivenza dopo i cinque anni. E′ utile sopratutto allorquando il tumore e′ molto voluminoso. L′A. ritiene che l′asportazione radicale della mammella, con irradiazione complementare nei tumori voluminosi, rappresenti tuttora la cora di elezione. Richiama anch′egli l′attenzione sopra la necessita′ che ogni donna (e piu′ specialmente quelle nel 5°-6° decennio) si sottoponga ad un controllo periodico, possibilmente ogni sei mesi. Cio′ in base ad una prognosi migliore per i cancri scoperti precocemente.

SUMARIO

Cuando se trata el cancer de la mamma, que aun esta confinado a esta glandula– estado clinico #1,– los resultados son mas satisfactorios que cuando esta enfermedad ya ha pasado de los confines de la glandula– estado clinico #2–.

Los pacientes con tumores de poca duracion tienen mas probabilidades de sobre-vivir cinco anos y mas, que aquellos con larga duracion.

La irradiacion no aumenta apreciablemente la sobre-vivencia de cinco anos o mas en los casos en el estado clinico #1 o en el #2. Sin embargo la irradiacion en casos de tumores grandes en ambos estados clinicos aparentemente es de gran beneficio. La amputacion radical de la mamma, con irradiacion de los tumores grandes en ambos estados clinicos, parece ser el tratamiento de seleccion, de acuerdo con este estudio.

El cancer de la mamma es mas comun en la quinta y sexta decadas de la vida. Sin embargo toda mujer no obstante su edad debe de examinar sus pechos frecuentemente y tambien por su medico cada seis meses. Ellas debe de ser educadas a la realizacion que el cancer en sus comienzos tiene un prognostico mas favorable.

SOMMAIRE

Dana le cancer du sein, tant que la maladie est confinée au sein, on obtient de meilleurs résultats que lorsque le cancer s'est étendu au-delà du sein. La malade présentant une tumeur récente a une meilleu chance de survivre cinq ans ou plus, que quand la tumeur est de longue dâte; l'irradiation n'augmente pas d'une façon notable la survivance de cinq ans; néanmoins l'irradiation des grandes tumeurs parait être d'une certaine utilité. L'amputation radicale d'une tumeur du sein, suivie d'irradiation, est le traitement du choix. L'incidence des cancer du sein est plus grande durant la cinquième et sixième décades de vie. Néanmoins, la femme de tout âge devrait examiner fréquemment ses seins et consulter son docteur régulièrement. C'est un fait reconnu que la cancer du sein diagnostiqué et traité en temps voulu fournit un pronostic plus favorable.

Extra Abdominal Rerouting of the Bile Flow in Irreparable Bile Duct Destruction

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THE final results of plastic reconstruction of the common biliary duct are not encouraging. Recurrent obstruction is the rule rather than the exception. There are three causes of failure:

1. Cicatricial stenosis at the anastomosis of bile duct and intestines.
2. Accumulation of sand or concrements within the remaining or newly constructed bile passages.
3. If inorganic tubes are used then their passage into the intestinal canal is, as a rule, in a short time followed by obliteration of the area where the tube was anchored. Vitallium tubes which were very much in favor at one time may even become acutely dangerous since they are apt to create pressure necrosis.

In cases where every attempt of plastic repair has ended in failure a satisfactory result can be expected only by a method which permits at frequent intervals dilatation and mechanical cleansing of the new connection between hepatic duct and intestinal tract. The simplest solution of this problem would appear to be an extra abdominal passageway for the bile. *This can be done by creating an external biliary fistula which, is connected by means of a rubber tube to an excluded loop of jejunum transplanted into the adjacent subcutaneous tissue.* The only objection to such a procedure is that in the absence of a sphincter mechanism the intestinal contents can be forced into the biliary duct system causing ascending biliary infection; however, experiences with short circuiting cholecystojejunostomy, choledochoduodenostomy and hepaticoduodenostomy have shown that this disadvantage has little practical significance.

We have been unable to find definited unequivocal values of biliary pressure in man under pathological conditions. Nevertheless it was felt that in a patient with a prolonged history of biliary stasis, recurrent progressive obstruction and repeated ascending cholangitis, structural and functional changes may have taken place in the liver parenchyma and the intrahepatic duct system which would enable it to produce bile under abnormally increased pressure and thus overcome the pressure of the intestinal contents.

On the basis of these theoretical considerations and in view of the fact that all other conventional means of internal anastomosis between the biliary passages and the intestinal tract had already failed, this above mentioned simple kind of external rerouting of bile flow was instituted in a patient whose history reveals the following important facts.

CASE HISTORY

Female, age 40, April 1944 cholecystectomy for cholelithiasis. The surgeon described the operation as uneventful and typical. In the first days following operation there was increasing jaundice, large collection of bile in subphrenic and subhepatic space. Both collections were drained through the previous abdominal incision. As drainage of the subphrenic space was insufficient a transdiaphragmatic incision of the subphrenic space was performed four weeks after the original cholecystectomy.

Injection of lipiodol into the remaining biliary fistula gave evidence of a rather long stenosis of the common and the hepatic duct.

Revision—June 22, 1944. Only the peripheral end of the common duct was found to be intact, but very narrow. No bile was obtained from this end of the common duct. The entire hilus of the liver was occupied by dense scar tissue. The idea of end to end anastomosis of the common and hepatic duct was abandoned. The external biliary fistula was followed into the hepatic duct and a hepaticoduodenostomy performed over a rubber tube. There was temporary improvement, stools regained normal color.

Seven weeks later, readmission to the hospital with colicky pains, high temperature. Preoperative diagnosis: recurrent bile duct obstruction. Relaparotomy. The rubber tube was removed; it was filled with concrements and sand. Central to the tube retention of turbid white bile and pus was found. A large rubber tube was again inserted into the hepatic duct and a hepatico-gastrostomy performed over this tube. Symptoms of cholangitis subsided within ten days postoperatively.

Six weeks later again obstructive symptoms (jaundice, temperature). X-ray picture showed that the tube had passed into the stomach. Relaparotomy. The tube was extracted from the stomach. The former canal of the tube was filled with stones and sand. A Goetze type of hepatico-jejunostomy was performed. Uneventful recovery.

Patient was comfortable for about a year. Then again chills, fever, jaundice, vomiting and coliky pains. Relaparotomy June 5, 1946. Exposure of anastomosis revealed stenosis by constricting heavy scar tissue; retention of infected bile, concrements, and sand central to the anastomosis. In view of the repeated reformation of concrements, it was felt that any kind of anastomosis would again become defunctionalized, by sand and sediment of bile concrement. Therefore, a F24 catheter was inserted into the hepatic duct for about 10 cm. and brought out through the abdominal incision after epiploic omentum had been wrapped around the tube. The excluded jejunal loop, which at the previous operation was used for the hepatico-jejunostomy was then exposed and another tube inserted into this jejunal loop by a Witzel type of jejunostomy, and brought out of the abdominal wall about 6 cm. medial to the point of exit of the hepatic tube.

The hepatic tube was permitted to drain bile into a bottle for a few days and after adequate drainage was observed, it was connected with the jejunostomy. After about two weeks, when it was felt that adequate canalization of both the hepatic and jejunal fistula had occurred, these tubes were removed and replaced by a F24 whistle tip catheter which was introduced at the end for about 10 cms. into the hepatic duct and at the other directly into the jejunostomy. The patient had an uneventful recovery with her temperatures gradually reaching normal values, her jaundice subsiding and her stools becoming brown in color.

The patient has since then lived for two years and three months and during this time, her condition has—with some remissions—steadily improved. The main difficulty during the first six months was management of the two fistulae which put the patient's as well as her husband's endurance to a great test. Three months postoperatively she was hospitalized for three days in order to irrigate and cleanse the hepatic fistula which had become obstructed with debris. About four months later, she developed cholangitis and was admitted to the hospital for nine days, receiving streptomycin 200,000 units every three hours for one week. Her temperature was normal during this time and her pain subsided.

During the following year, the patient's general condition gradually improved. Her weight increased from 92 to 100 pounds. The pain and discomfort on the right side became less frequent and less intense in character. However, it was necessary for her to be treated regularly in order to keep the biliary fistula in working condition. Granulating tissue at the external orifice had to be cauterized to prevent blockage of the canal and the tube had to be changed from time to time. There was also a certain amount of skin irritation around both orifices and we found after some experimentation that aluminum powder was the most effectual means of keeping the skin protected and clean. Occasionally the biliary fistula had to be dilated but all these procedures became necessary with less frequency during the course of the following 15 months. At the end of this time, after the patient had failed to report for a check-up for four and a half months, she developed a stenosis of the external orifice of the biliary fistula and was hospitalized for five days. The biliary fistula was enlarged by bilateral splitting of the skin surrounding the external opening which had contracted. The inside tract was dilated with Hegar dilators up to F24, after which a good flow of bile was obtained. A new F24 catheter was placed into the biliary fistula and the jejunostomy. Patient was discharged in excellent condition with normal temperature.

Since that time, she has led a fairly normal life attending to her usual domestic duties. She had learned how to take care of catheter and how to keep the skin around the fistulous openings clean. The only dressing required was a small piece of 4 x 4 gauze and a strip of elastoplast to hold it in place. She complained of little pain, had normal temperatures and gradually gained in appetite and weight. She was even able to go swimming without ill effects Unfortunately, about one-half year later, the patient sustained a fatal head injury in an accident and died from a subdural hemorrhage.

We feel, however, that a two year-three month survival period with gradual improvement in general health would indicate the feasibility of the above described method in cases of complete destruction of the hepatic and common bile duct where other methods of internal anastomosis have failed.

SUMMARY

In a patient where repeated attempts of reconstruction of the extrahepatic bile ways ended in failure because of formation of concrements, an extra abdominal passageway was instituted. Thus mechanical cleaning of the bile way in regular intervals became possible.

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The Acute Surgical Abdomen*

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A SURGEON, no matter how seasoned or skilled, will always be confronted with the annoying perplexities presented to him by the acute abdomen. After examining the charts from the surgical services at the Cook County Hospital for a period of ten years, I have found six outstanding conditions which we mistake most frequently. They are:

1. Perforated peptic ulcer.
2. Acute appendicitis.
3. Acute cholecystitis.
4. Renal colics.
5. Acute hemorrhagic pancreatitis.
6. Coronary occlusion.

Although coronary occlusion is not a surgical emergency, its correct diagnosis becomes of surgical importance when exploration is considered. There is a seventh disease which deserves special consideration, namely, salpingitis. Acute or chronic salpingeal pathology is frequently associated with a perihepatitis which produces pain in the right upper quadrant (pseudo-gallbladder pain). Because of this, gallbladder explorations and other surgical procedures have been done in cases of salpingitis, resulting in danger to the patient and embarrassment to the surgeon.

PERFORATED PEPTIC ULCER

Although not first in frequency among the conditions mentioned, the perforated peptic ulcer holds a place of primary importance in the diagnostic difficulties which it presents. This condition is rare in females. Usually a previous history of peptic ulcer or hemorrhage can be obtained, but the onset may be with perforation.

The patient states that he was seized with a sudden pain, usually after eating; this was so severe that it doubled him up. The classical picture of perforated peptic ulcer with board-like rigidity and a shock-like syndrome is too well known to bear repetition. Two signs which should be sought for in every case, however, are: (1) the findings with auscultation, and (2) the presence of pneumoperitoneum. Auscultation reveals an absolutely silent abdomen when an ulcer perforates, leaks and soils the peritoneal cavity. This is not new, since the late J. B. Murphy had stressed the importance of this finding many decades ago. When intestinal sounds are present, the diagnosis of perforated peptic ulcer is remote. There are exceptions, and one of these will be discussed presently under the subject of forme fruste ulcer.

The next sign which helps clinch the diagnosis is the demonstration of a spontaneous pneumoperitoneum. Normally a magenblase or stomach air bubble is present. When an ulcer perforates, this air bubble escapes into the general peritoneal cavity, and can be demonstrated either by percussion or with the fluoroscope; the latter is by far the more accurate. The patient is placed on his left side so that the free air bubble may gravitate upward between the liver and the right hemidiaphragm. By so doing, the liver is displaced downward and is separated from the diaphragm. Normally the liver hugs the diaphragm and no air space is visible between them. If this air is of an appreciable amount, normal liver dullness is obliterated and in its place a tympanitic note is produced by percussion. The sign is easy to demonstrate, quite pathognomonic of perforated peptic ulcer, and present in about seventy percent of all cases.

The forme fruste ulcer deserves special mention. The term refers to a pin-point perforation in the stomach or duodenum which is immediately sealed over by muscular contraction or by the overlying liver. Therefore, the spillage is minimal and the amount of peritoneal soiling is small. Such patients may experience a sudden sharp pain in the epigastrium, but the typical physical findings are lacking. This patient may be able to straighten up and walk about Abdominal sounds are usually present and the air bubble may remain intragastric, having had no chance to leave the small perforation These patients present a misleading picture and have been misdiagnosed However, with the ingestion of their next meal they usually reperforate and then present the typical findings

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The temperature pulse and respirations will depend upon whether or not shock is present Most perforated peptic ulcers present a shock like picture which varies in its intensity The shock associated with perforated ulcers responds rapidly to therapy Within a few hours, the classical picture of peritonitis develops with the associated increase in temperature, pulse and respiratory rate

The contents from a perforated ulcer may pass downward along the so called "paracolic gutter of Moynihan," pool around the appendix and produce exquisite tenderness at McBurney's point The diagnostician must then be on his guard, since such a history would suggest an epigastric distress with localization to the right lower quadrant which could be confused with an acute appendix Upon exploratory operation, free fluid will be found *in the peritoneal cavity with all signs* of a peritonitis and a red and injected appendix seen and removed These patients usually die if the leaking ulcer is overlooked This catastrophe can be avoided if, before closing the abdomen, the appendix is opened and the mucous membrane examined Since acute appendicitis starts in the lumen of the appendix and travels outward a normal appearing mucous membrane would suggest looking elsewhere for the cause of the peritonitis

Laboratory data includes the flat x ray film which has been discussed under the subject of spontaneous pneumoperitoneum Routine blood count and urinalysis are done Some of these patients might have bled and although perforated ulcers are known not to produce massive hemorrhage signs of a secondary anemia may be present

ACUTE APPENDICITIS

The more one sees of this condition the more one respects it The statement "only an appendix" is indeed a dangerous one Acute appendicitis is most frequently found in individuals under the age of forty and is somewhat more common in males It will be recalled that gallbladder conditions appear most frequently after the age of forty The story that the patient relates is usually quite stereotyped To put it in his language "Something I ate gave me a bellyache" This is his way of describing acute epigastric distress When he gets this "bellyache" he often attempts to obtain relief with either a cathartic or an enema Within the first twenty four hours his "bellyache" becomes a soreness low on the right side His acute epigastric distress has become localized to the right lower quadrant

The "two question test" is both useful and time saving *Question Number One.* "Where was your pain when it started?", to this interrogation the patient points to his entire abdomen *Question Number Two* "Where does it hurt you now?", he then points to the right lower quadrant, usually McBurney's point This simple *method of having the patient* demonstrate diffuse pain which localizes to the right lower quadrant will diagnose the vast majority of cases of acute appendicitis

Vomiting and nausea have been impressed upon us as being associated with appendicitis This is the exception and not the rule Anorexia, or loss of appetite, is more constant and more important than either nausea or vomiting Anorexia, nausea and vomiting are three degrees of one symptom, anorexia is the mildest form and is associated with mild distention of the appendix, nausea, the middle degree is due to moderate distention, and vomiting the maximum degree is found in greatly distended appendices The most common symptom *in acute appendicitis is anorexia and if* the patient states that his appetite is not altered we doubt the diagnosis of an acute appendix Two complaints which are extremely rare in acute appendicitis are diarrhea and chills These are probably found in less than one percent of the cases Constipation is the rule

Fever is not an early finding in acute appendicitis, in fact if present it is suggestive of peritoneal soiling It is true that cases of acute appendicitis may have a fever of 102° or 103°, but these are no longer cases of appendicitis they are cases of far advanced peritonitis. Children prove the exception to this rule. If appendices would be operated upon when the temperature is below 99° the mortality would be very low.

Acute appendicitis does *not* give right rectus rigidity. Although the reverse is taught in many schools and textbooks, this point should be clarified. It is impossible for an individual to contract his right rectus muscle without contracting the left, therefore, when pressure is made upon an inflamed area, both rectus muscles contract. When only one rectus is rigid it suggests an underlying mass, such as a tumor or abscess. When both recti contract to pressure it should be considered "muscular defense" rather than right or left rectus rigidity. The importance of this bears emphasis when we realize that diagnosis, treatment and prognosis may depend upon the presence of right rectus rigidity or simple musclar defense.

The iliopsoas and obturator signs are not signs which diagnose actue appendicitis, but rather locate an acute appendix. Probably a misconception has arisen because these signs are usually discussed under the heading of acute appendicitis; they may, however, be produced in other diseases. The right iliopsoas sign is elicited by placing the patient on his left side and hyper-extending the right leg. If positive, pain is produced over the iliopsoas fascia which will be manifested in the region of the right lower quadrant. In the presence of a history of acute appendicitis this would signify that the inflamed appendix is overlying the iliopsoas fascia and is retrocecal. A positive obturator sign will locate an inflamed pelvic appendix. It is conducted in the following way: with the patient on his back the thigh is flexed upon the abdomen and the leg
upon the th leg is then abducted. T
causes inter ion of the thigh
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pushed to the right will produce pain over the cecal region, which is quite diagnostic of acute appendicitis.

Routine bi-digital examinations are done; at times an acute appendix or appendiceal mass may be felt. Late and neglected appendices may produce a pelvic abscess which points rectally or vaginally, and this examination reveals the proper site and time for incision and drainage.

The laboratory data usually consists of a white blood count and a urinalysis. More important than the white blood count or urinalysis is a differential blood count; this is easy to do and more accurate. If the "poly" count is high, we assume that an acute infectious process is present; a high "poly" count in the presence of a low white count means a poor prognosis. The urinalysis is usually negative but may be misleading; a few red cells in the urine are not pathognomonic of renal pathology. Negative urines have been recorded where a renal stone completely blocks the ureter so that no blood or pus can pass into the bladder.

Flat x-ray films are of value in the diagnosis of acute appendicitis. If an opaque stone casts a shadow on the right side, one readily realizes that this may be located either in the appendix, the ureter, or gallbladder; phleboliths must also be considered. Stereoscopic views, intravenous pyelography, and the nature of the opaque shadow cast will usually locate the region in which the stone is located. If such a stone appears to be in the appendix, this almost always is diagnosed as an acute appendicitis.

ACUTE CHOLECYSTITIS

The dictum that certain types of people are predisposed to certain types of diseases seems to be correct. The gallbladder type is described as being fair, fat and forty, usually
female in the latter third or fourth decade
d somewhat obese. There is always an ex-
tion to the rule, hence, the most fulminat-
hydrops of the gallbladder on our service
en in a young thin boy of sixteen. The
forty is related to a previous history of
cy, and this is theoretically explained
lowing way: the average female has
n in the second decade of life, and

while pregnant she develops a physiologic hypercholesterolemia Some of this cholesterol deposits on the mucous membrane of the gall bladder, forms polypi which break off and become the nuclei for stones It may take from 10 to 20 years for gallstones to attain any appreciable size, so that by the time she reaches her fourth decade the stone is large enough to obstruct or irritate Nulliparous women can also have gallstones or gallbladder disease, but this too is the exception and not the rule

In the middle aged female the history of recurrent attacks of abdominal pain, so severe that the physician must administer a sedative is an acute gallbladder until proved otherwise Acute appendicitis does not require morphine, renal colics will be differentiated presently, and coronary occlusion is rare in the female One of the most unusual lesions noted in the female is a perforated peptic ulcer The gall bladder patient also presents a previous history of "selective dyspepsia" By this we mean that there are certain specific foods that she cannot tolerate There are four primary offenders to these foods, they are fried and fatty foods, raw apples, cucumbers and cabbage The patient does not use the term "dyspepsia," but describes this distress as the two "B's," namely, bloating and belching To summarize and describe the gallbladder patient one may use an alliteration and state that she is the patient with the seven "F's" she is the fair, fat, fertile, flatulent, flabby, female of forty

The complaint is one of pain, and it is important to determine the type of pain which is present A constant pain is due to edema but colicky pain is caused by obstruction This is one of the factors which indicate whether the case be treated conservatively or surgically It is unwise to treat an obstructed lesion conservatively, since these are cases which result in early gangrene and perforation Morphine should not be used in gall bladder disease because it is a smooth muscle contractor, and since the gallbladder is a smooth muscle organ one should not administer a medicament which would stimulate its activity By increasing muscle tonus, morphine may actually aggravate or provoke gall bladder pain and colic

One should not state however that the drug must never be used in gallbladder disease, since it still has its place, namely to prevent shock These patients are treated first with nitrite therapy One breaks an amyl nitrite bead and lets the patient inhale the vapors, 1/100th grain of nitroglycerin is placed under the tongue, and three grains of sodium amytal or any other barbiturate is given by mouth If this gives no relief we administer a hypodermic which consists of 100 mg of demerol and 1/100th of a grain of nitroglycerin Should these measures fail, antispasmodic therapy with such drugs as papaverine aminophylline, et cetera, is tried Morphine is used only after all other measures have failed

Gallbladder pain is usually located under the right costal margin but may be referred to the stomach since these two organs originate from the same embryologic segment The stomach responds to this stimulus in one of three types of gastric spasm (1) pylorospasm, (2) midgastric spasm and (3) cardiospasm If a pylorospasm is produced, the gallbladder condition might be confused with peptic ulcer, if midgastric spasm results a stomach carcinoma may be erroneously diagnosed, and if associated with cardiospasm, the pain appears on the left (pseudo-coronary pain), and coronary disease may incorrectly project itself into the diagnostic picture

Radiation of pain should not be confused with referred pain By radiation we mean that gallbladder pain, located under the right costal margin, may radiate along the path of the seventh intercostal nerve to the inferior angle of the right scapula, or the interscapular region Gallbladder pain, therefore, cannot radiate to the right shoulder Shoulder pain is an entirely different mechanism which involves the phrenic nerve and is indicative of peritonitis When a gallbladder patient has true shoulder pain a diagnosis of gangrenous or ruptured gallbladder with biliary peritonitis should be made

Temperature, pulse and respirations are included under the heading of physical examination The patient with an acute gall bladder has an early high fever, hence, a temperature of 102° is not unusual within the first 12 to 24 hours of acute cholecystitis The early fever is explained by the absence of a submucosa Since this tough resisting layer is lacking, there is greater chance for early contamination and absorption in the peritoneal cavity. The patient has a pulse which is increased according to the temperature; therefore, for every degree rise in fever there will be approximately a ten beat increase in pulse rate. Respirations are slightly increased because breathing is painful. This is due to the fact that the inflamed gallbladder rubs against the sensitive parietal peritoneum; because of this, acute gallbladder disease may be confused with pneumonia or pleurisy.

Although pain, a symptom, may be referred anywhere along its nervous path, tenderness, a physical finding remains at the site of pathology. This is an excellent diagnostic rule, having few if any exceptions. The tenderness of gallbladder disease will be located in the region of the right costal margin. If it is most marked on a level with the umbilicus, it may be difficult to determine whether the condition is an inflamed, low-lying gallbladder or an acute high-lying retrocecal appendix.

Two ways aid in the differentiation of these two conditions. First, we recall that the normal abdomen reveals a tympanitic note to percussion in all four quadrants. If the tenderness opposite the umbilicus is due to an inflamed gallbladder, we assume that the organ is unusually large or that a ptotic liver with an inflamed gallbladder at its free border is present. This would cause an obliteration of the normal tympany in the right upper quadrant and in its place the percussion note would be one of dullness or flatness. If the patient presents tenderness on the level with the umbilicus and retains normal tympany in the right upper quadrant, this would point to a high-lying retrocecal appendix.

Another method of differentiating the gallbladder and appendix is by means of Ligat's test. This test locates areas of hyperesthesia over an inflamed organ. If the tenderness is due to gallbladder disease an area of hyperesthesia (elicited by picking up the skin and letting it drop) is present from the umbilicus upward to the right costal margin. If the tenderness is due to an acute appendix, the area of hyperesthesia will be found from the umbilicus down to Poupart's ligament.

A rectal examination is done as a routine in every physical examination. More important than the rectal or vaginal examination is a so-called bi-digital, which is conducted by placing the index finger in the vagina and the middle finger in the rectum with the perineum in between. This will immediately orient the examiner and adnexal pathology will be revealed.

A flat x-ray film should be taken in every acute abdominal condition. One may determine whether a calcified gallbladder or visible stones are present. It also gives an indication as to whether or not the liver is enlarged or ptotic. Routine laboratory tests are done.

RENAL COLICS

Stones are not the only substance which produce renal colics, since the same syndrome may be produced by a small blood clot, inspissated pus, uratic debris, or a kinking of the ureteropelvic junction in a ptotic kidney.

The condition is more common in males, and the patient may reveal a history of previous attacks, a hereditary influence, a story of gout, or parathyroid pathology.

The patient complains of a sudden pain which starts in the lumbar region and radiates to the testicle, vulva, or the inner aspect of the thigh. With this pain he becomes extremely restless and thrashes about. A patient who is experiencing a colic is restless and moves about, but one who has a peritonitis lies perfectly quiet and resents being moved. Vomiting is a common symptom as is a frequency of urination. During the act of micturition the pain may be altered.

Physical examination rarely reveals any elevation in temperature, but extremely characteristic of the condition is a bradycardia. It has ofttimes been stated that when a patient with an acute abdomen has "a clean tongue and a slow pulse" he has a renal colic until proved otherwise. Tenderness is most marked in the region of the twelfth rib of the involved side, and to elicit this finding it is unnecessary and cruel to utilize any type of "punch" test. The tenderness is so exquisite that mild percussion will demonstrate it. We prefer to use the term "Murphy tap" to "Murphy punch." A zone of hyperesthesia is usually found posteriorly at the level of and slightly below the twelfth rib. If this area is anesthetized with novocaine, the hyperesthesia and pain disappear

A flat x ray film may reveal a stone if such is present but this is not reliable since non opaque substances may also produce kidney colic An intravenous pyelogram can be made without disturbing the patient and if necessary the film can be taken at the bedside with the aid of a stationary grid The significant *finding for a diagnosis of a stone in the ureter* is the anuria which may be present on the affected side, the opposite side shows normal excretion The kidney on the affected side usually appears increased in density since the dye in these tubules is more concentrated This finding is sufficient for diagnosis of non opaque stones in the ureter A catheterized specimen of urine usually reveals pus, blood and albumin The presence or absence of pus and blood in the urine is not pathognomonic since a stone may completely block the ureter and result in a normal urine On the other hand, an inflamed appendix may be attached to the ureter, kidney or bladder resulting in a secondary ureteritis, nephritis or cystitis with an associated hematuria In such instances the laboratory report may be actually misleading

ACUTE HEMORRHAGIC PANCREATITIS

It is important to recall that this disease may appear in one of two forms either acute edematous pancreatitis or hemorrhagic pancreatitis The former presents a mild clinical picture, but the latter which is associated with fat necrosis and occasionally a hemorrhagic peritonitis produces a fulminating one The acute edematous form usually improves rapidly without therapy within 48 hours but hemorrhagic pancreatitis gets progressively worse and often requires surgical intervention It is the hemorrhagic type, therefore which is important to identify and treat promptly

Although the etiology of pancreatitis is unknown, there seems to be a mechanical factor which is associated with spasms, stones swelling and stasis The patient who develops acute pancreatitis is usually of the same type who develops gallbladder disease therefore, the condition is more common in females, rarely occurring before the age of forty, and is seen in stout people The ratio of colored to white is 1 to 50 The attack usually follows the ingestion of a heavy meal The pain is dramatic, sudden and excruciating It is felt in the epigastrium, and radiates into one or both loins In this way pancreatic pain radiation resembles an inverted fan When the patient sits up or lies on his abdomen the *pain is relieved, and is aggravated when he is* on his back Hence, in most pancreatic conditions be they tumors or inflammations the patient is usually found lying on his abdomen or in a sitting position Reflex vomiting or retching almost always occurs emesis which is truly reflex in nature is never feculent

Physical examination reveals a patient who is usually in shock with cold and clammy extremities subnormal temperature, and a rapid, thready pulse Local epigastric tenderness is almost always present and is associated with a type of muscular defense which is localized to the same area The rigidity is not truly board like in nature, and the tenderness is most marked midway between the umbilicus and the xiphoid An occasional finding is ecchymosis in one or both loins or at times around the umbilicus This is due to extravasated blood which finds its way around the retroperitoneal space and presents itself as greenish yellow or purplish discolorations This finding takes two or three days to appear Mild jaundice is present in about half of the cases, this is explained by the fact that the common duct is pressed upon by a swollen head of the pancreas Abdominal auscultation usually reveals a quiet but not silent abdomen

Laboratory findings may be helpful in the diagnosis An increase of serum amylase is specific in the acute phase, although a normal reading does not rule out acute pancreatitis Polowe has emphasized the importance of determining the blood amylase activity in terms of cuprous oxide precipitation He has shown that moderate to marked blood amylase activity is almost always associated with diseases of the pancreas, and normal or decreased blood amylase almost always excludes pancreatitis Hypocalcemia is usually present and the level found is usually below nine A flat x ray film of the abdomen may reveal a separation of the upper and lower limbs of the duodenum brought about by an edema of the head of the pancreas. This latter finding is unusual.

CORONARY OCCLUSION

Although this belongs to the realm of the internist, the general practitioner as well as the surgeon must be on his guard to avoid the fatal error of confusing an acute coronary disease with an acute abdominal condition.

Men are most susceptible to this condition, and it is usually found in those past the age of forty. A previous history of dyspnea or pain in the chest during exertion or excitement may be elicited. The attack is sudden, with severe pain in the chest which radiates out the left arm toward the abdomen or both shoulders. There is a sense of impending death with severe fright which usually supersedes the complaint of pain. The radiation may also be toward the epigastrium, so that the examiner's attention is directed to the abdomen rather than the chest. A usual complaint during such an attack is one of "indigestion." Although the pain of acute coronary disease may occur in the abdomen, it does not become localized, hence, no area of local tenderness is ever found. Marked abdominal distention may be present in coronary pathology but muscle or rectus rigidity are lacking.

In abdominal catastrophes the patient lies perfectly quiet, but the coronary patient resembles the colic in that he is restless and tosses about. The acute cardiac patient presents veins in the neck which are distended and full, in contrast to the patient with the surgical abdomen who may appear pale and bloodless. Signs of impaired circulation are usually present, such as dyspnea, orthopnea and cyanosis. Auscultation will usually reveal rales in both bases due to pulmonary congestion. Cardiac enlargement, feeble heart sounds and occasionally a pericardial friction rub may be found. During auscultation of the abdomen, normal intestinal sounds will be heard which are absent or diminished in cases of peritonitis.

Positive electrocardiographic findings are pathognomonic, but one is not always fortunate enough to have an electrocardiogram handy. A leukocytosis may be present some hours after the disease takes place, and the urine is usually negative unless there is associated renal pathology.

We realize that many other conditions at times require differentiation in the acute abdomen. Some of these are: strangulated herniae, regional ileitis, mesenteric lymphadenitis, mesenteric thrombosis, ruptured ectopic pregnancy, ruptured graafian follicle, ileocecal tuberculosis, vasitis, torsion of the omentum, volvulus, intussusception, etc., etc., ad infinitum. However, when one misses one of these unusual conditions he does not feel quite as responsible or guilty as he would having missed one of the aforementioned "Big Six."

SUMMARY

Perforated peptic ulcer, acute appendicitis, acute cholecystitis, renal colics, acute hemorrhagic pancreatitis, and coronary occlusion, are the six outstanding conditions which the author states are most frequently misdiagnosed in cases of the acute surgical abdomen. Although coronary occlusion is not a surgical emergency, its correct diagnosis becomes of surgical importance when exploration is considered. A seventh disease is also named which is, salpingitis. Acute or chronic salpingeal pathology is frequently associated with a perihepatitis which produces pain in the right upper quadrant (pseudo-gallbladder pain). Because of this, gallbladder explorations and other surgical procedures have been done in cases of salpingitis, resulting in danger to the patient and embarrassment to the surgeon.

After a thorough probing of the six aforementioned conditions, the author reports that many other conditions at times require differentiation in the acute abdomen. Some of these are: strangulated hernia, regional ileitis, mesenteric lymphadenitis, mesenteric thrombosis, ruptured ectopic pregnancy, ruptured graafian follicle, ileocecal tuberculosis, vasitis, torsion of the omentum, volvulus, intussusception. However, misdiagnosing one of these unusual conditions is more explanable than missing the symptoms of the *primary six.*

RIASSUNTO

Le malattie che conducono piu' frequentemente ad un attacco acuto sono: ulceri peptiche perforate, appendicite acuta, colecistite acuta, colica renale, pancreatite emorr-

agica acuta, occlusione delle arterie coronarie. Quest'ultima condizione, per quanto non di pertinenza chirurgica, puo' coinvolgere un problema chirurgico allorquando venga posto in considerazione un intervento operativo.

Una salpingite acuta o cronica, spesso associata ad una periepatite, con dolori nel quadrante superiore destro, puo' rientrare nella diagmosi differenziale, perche' molte operazioni inutili, che danneggiano la paziente *ed imbarazzano il chirurgo, sono state eseguite* in casi dubbi.

Dopo aver discusso le caratteristiche cliniche di queste diverse condizioni morbose, l'A no elenca molte altre, meno comuni, che richiedono volta per volta una diagnosi differenziale nell'addome acuto. Fra le tante. ernia strangolata; ileite regionale; linfadenite *mesenterica; trombosi mesenterica; gravidanza* ectopica; rottura di follicoli di Graaf; tubercolosi ileo-cecale; torsione dell'omento; volvolo; intuscezione. Un errore nella diagnosi differenziale e' piu' facilmente spiegabile che l'ignorare i sintomi delle diverse malattie.

SUMARIO

En la experiencia del autor, la ulcera peptica perforada, la apendicitis aguda, la colecistitis aguda, el colico renal, la pancratitis hemorragica aguda, y la oclusion de la arteria coronaria, son las seis condiciones que se confunden mas frecuentemente en el diagnostico del abdomen quirurgico agudo. El reconocimiento de la oclusion de la coronaria es de importancia *en el diagnostico diferencial* de las emergencias quirurjicas La salpingitis es la septima enfermedad que tambien debe de considerarse La salpingitis aguda o cronica esta frecuentemente asociada con la peri-epatitis que produce dolor en el quadrante supraumbilical derecho (dolor pseudo-vejical). Por esta razon exploraciones de la vejiga de la hiel se *han practicado erroneamente en* casos de salpingitis, con peligro del paciente y resultante embarradura del cirujano. El cirujano por lo tanta debe de proceder con cuidado en el diagnostico diferencial de las condiciones mencionadas y en ciertos casos debe de tambien considerar las condiciones siguientes · La hernia estrangulada, la enteritis regional, la linfadenitis mesenterica, la trombosis del mesenterio, el embarazo ectopico, la ruptura del foliculo de Graf, la tuberculosis ileo-cecal, torcion del omento, el volvulo, la intusucepsion intestinal. Sin embargo el errar en el diagnostico de estas enfermedades es mas excusable por cuanto no son comunes, no asi *las seis primeras mencionadas*

SOMMAIRE

L'ulcère peptique perforé, l'appendicite aigüe, la cholecystite aigüe, les coliques rénales, la pancréatite hémorragique aigüe et l'occlusion coronaire, sont les six conditions *qui sont le plus fréquement diagnostiquées* faussement dans les cas de l'abdomen chirurgical aigü. Quoique l'occlusion coronaire ne soit pas une lésion chirurgicale urgente, son diagnostic est d'une grande importance chirurgicale, quand on discute la nécessité d'intervenir opérativement. Il faut aussi considérer la salpingite. La pathologie aigüe ou chronique *des trompes de Fallope est fréquemment accompagnée* d'une périhépatite produisant des douleurs dans le cadran supérieur droit. A cause de ceci, l'exploration de la vésicule biliaire et d'autres procédures chirurgicales ont été faites, dans des cas de salpingite; il en ait résulté du péril pour l'opéré et de l'embarras pour l'opérateur. Apres avoir discuté *les six conditions ci-dessus mentionnées,* l'auteur nous dit qu'il y a d'autres conditions qui doivent être différenciées dans l'abdomen aigü. Parmi celles-ci, on peut énumerer: l'hernie etranglée, l'iléite régionale, la lymphanédite mésentrique, la thrombose mésentrique, la rupture des grosses ses ectopiques, la rupture des follicules graafiens, la tuberculose *iléocécale, la torsion de l'omentum, le* volvulus et l'intussuception. Il est plus excusable de se tromper dans ces conditions que dans les six conditions citées au debut de cette communication.

Congenital Valves of the Posterior Urethra

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CONGENITAL valves of the posterior urethra are frequently the causative factors of a series of urinary complaints which invariably and inevitably result fatally unless surgical intervention is instituted. The great variance of symptoms portrayed and the intensity of the symptoms frequently make differentiation from other infravesical obstructive factors impossible, except by complete urologic examination. Too frequently, a diagnosis of "chronic pyelitis" or more often a diagnosis of eneuresis is offered without the benefit of urological examination. A complete urological examination should always be considered in every instance of continued pyuria or eneuresis in either sex. Anomalies of the genito-urinary tract are among the most common malformations observed in the human body. Granted that although a percentage of these anomalies is not manifested either by primary or secondary symptoms until later in life, the majority of instances are observed within the first few months or years after birth. The presence of pyuria and infection are secondary symptoms which result from stasis of urinary flow. It is now an established fact that stasis of the urinary flow, regardless of the position of obstruction, predisposes to urinary tract infection. It becomes obvious that any child presenting protracted or recurrent pyuria should have the benefit of complete urological study to ascertain the presence or absence of obstructive factors.

Until recent years, the diagnosis of congenital valves of the posterior urethra was recognized only at postmortem or by accident during an operation for some other condition. The knowledge of the obstructive factors of congenital valves is well-established and it is not believed that the number of reported cases is at all a fair estimate of the frequency with which the condition actually occurs. It is firmly believed that the condition is not so rare as the sparsity of reported cases in the literature would suggest. As frequently as congenital valves of the posterior urethra have been observed during the past few years it is quite obvious that even today, the condition occurs more often than is recognized. Campbell considers that the anomaly known as congenital valves of the posterior urethra is the second most common of all congenital infravesical obstruction. As recently as 1937 he was able to collect only a total of 166 references in the literature. Since that time there are 38 additional references bringing the total to 204 cases. To this number, three cases herein reported are to be added.

Case 1. L. W. 18 months old white male, admitted to Temple University Hospital on the Pediatric Service with a history of failure to gain weight in nine months, a tendency to respiratory infection, marked constipation, and a large abdomen. Patient was well for six months after birth. At that time he had an attack of vomiting, cyanosis and constipation. At 13 months of age he developed acute diarrhea with low grade fever, malaise and anorexia. These symptoms persisted for five days but recurred after one month.

On admission, the abdomen was prominent and large fecal masses were palpable. After numerous enemas, a suprapubic mass, smooth and firm extending to the umbilicus was palpable. Barium enema revealed no evidence of organic disease of the colon and showed the suprapubic mass to be anterior and separate from the colon. Cystographic study revealed "considerable distortion of the urinary bladder. There is a spherical cyst-like compartment superimposed upon the major portion of the bladder. The upper margin of the dye filled bladder is approximately at the level of the umbilicus. A considerable amount of the opaque material passed up the left ureter which is visualized as an unusually large and tortuous structure and the kidney pelves did not visualize."

Intravenous urography was done. The examination was continued for three hours and at no time was there any evidence of the appearance of dye on either side of the upper urinary tract.

Cystoscopy was performed. "The cystoscope was introduced into the bladder at an extreme angle. *The bladder is dilated. The mucosa is extremely* pale and markedly trabeculated. The vesical orifice is markedly contracted and irregular. The inter-

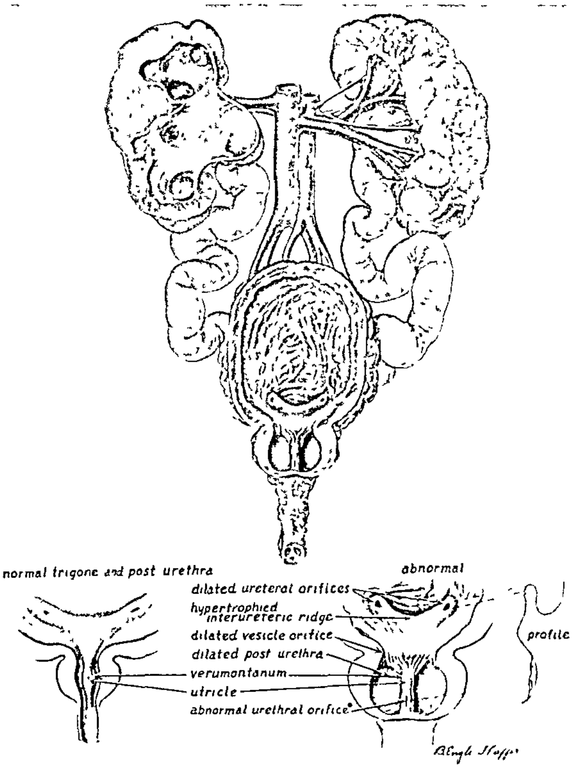
normal trigone and post urethra
abnormal
dilated ureteral orifices
hypertrophied interureteric ridge
dilated vesicle orifice
dilated post urethra
verumontanum
utricle
abnormal urethral orifice*
profile

Fig. 1. Artist drawing of genito urinary tract as observed at autopsy. Note the greatly dilated ureters and kidney pelvis and calices. Note lower right insert showing the abnormal urethral orifice located on the verumontanum and the greatly dilated posterior urethra Also note the marked trabeculations, the hypertrophied interureteric ridge, and the dilated ureteral orifices. It is considered that modification of type 3 is demonstrated.

ureteric ridge is markedly hypertrophied and gives the appearance of two bladder cavities."

Following cystoscopy, the temperature rose to 104.6 and continued for 48 hours in a typical septic fashion. On the morning of the third day, a distinct mass developed and was palpable in the left loin. The mass was considered to be a hydronephrosis. In view of the septic temperature and the presence of a mass in the loin, a decision was made to institute immediate nephrostomy drainage. The patient expired from acute cardiac dilatation during the surgical procedure. An autopsy was granted and performed. The report of the pathologist is as follows:

"The genito-urinary tract is removed in toto. Both kidneys appear enlarged. Protruding from the left pelvis is a rubber catheter. There is uniform dilatation of both ureters. Each capsule strips easily, revealing a pale grayish pink smooth cortical surface. Upon sectioning, one finds the distention of the pelves and calyces has caused pressure atrophy of the renal parenchyma. In some places the cortico-medullary layer is only 1.5 cms. thick. Cloudy fluid fills the pelves. The pelvic lining is hyperemic and granular. No source of obstruction is encountered in the ureters. The ureteral walls are thin and the mucosa is flattened. There is considerable distention of the bladder with increased volume capacity. The wall is thin and the mucosal lining trabeculated. No obstruction is found at the ureteral orifices. There is a marked interureteric ridge."

The urethral opening is widely opened and a diffuse dilatation of the prostatic urethra has resulted in the formation of large cyst-like structure surrounded by a thin layer of prostatic tissue. A probe inserted at the urethral meatus easily passes through the penile urethra, however the latter is not continuous with the prostatic segment and the probe instead emerges from a tiny slit in the verumontanum approximately 2 mms. in size. This small opening being entirely inadequate readily explains the urinary retention and the obstructive sequillae (Fig. 1).

In retrospect. The abdominal mass extending to the umbilicus was a greatly dilated bladder and not a cyst of the urachus as was surmised. On cystoscopy, what was considered to be the hypertrophied interureteral ridge was in reality the greatly dilated vesical orifice. What was considered to be the contracted vesical orifice was the edges of the sinus in the verumontanum through which the cystoscope entered the greatly dilated posterior urethra.

Case 2. W. A., 19 year old colored youth was admitted to Temple University Hospital on the Medical Service in a semi-comatose condition having suddenly become drowsy. Examination on admittance showed an unresponsive hyperemic individual lying flat in bed. Blood pressure was 130/90. Polyuria was present. the urine having a fixed specific gravity at 1007. Blood urea nitrogen was 100 mgms. Following treatment improvement occurred to a point of being able to walk around. He gave a history of having been examined in another institution six years previously. A diagnosis of congenital stricture of the urethra and of the ureteral orifice and a bilateral hydronephrosis was made. He did not return for treatment.

Subsequent study showed that the blood urea nitrogen remained at 100 mgms. An intravenous urogram showed no concentration of dye. A cystogram revealed a dilated bladder and dilated ureters as well as massive distention of both calyceal systems.

Cystoscopy revealed a marked congestion of the entire versical mucosa. Extensive bullous edema involving the entire trigone and obliterating the ureteral orifices was noted. The vesical orifice was widely dilated as was the posterior urethra. Rectal examination revealed a very highly situated prostate and a distinct firm transverse ridge extending across the rectum above the prostate.

An attempt was made to institute decompression by indwelling Foley catheter. He was unable to tolerate the catheter. Approximately one week before death, the blood pressure rose to 190/120. The patient developed an enlarged liver as well as marked dysponea. Acute congestive failure was so severe that he expired.

Autopsy was granted and performed. Examination of the genito-urinary tract revealed that the right kidney was flabby and small (Fig. 2). Section showed it to consist of very remarkably dilated calyces within a 3 mm. shell of probably non-functioning cortex. The left kidney also showed a remarkable degree of hydronephrosis but there was an area approximately 4 cms. in diameter which was probably viable renal tissue. There was remarkably little evidence of infection, although there was an extensive peri-capsulitis bilaterally. Both ureters were dilated from kidneys to entrance into bladder, being about 1½ cms. in diameter.

The bladder wall was hypertrophied and the mucosal surface showed scattered pinkish areas of ulceration. The trigone was longer than normal but exhibited the normal relationships. The ureters opened into the bladder about 4 cms. above the verumontanum. The internal urethral orifice and prostatic portion of urethra was ballooned out and the lateral lobes of the prostate bilaterally extended far above the trigone region. This all suggests that the trigonal area has been pushed down through pressure of a distended bladder. The posterior portion of the prostatic urethra showed a small valve bilaterally which seemed to be an extension of the verumontanum (Fig. 3). There was in addition an outpouching of the urethra above the congenital valves described, which extended both dorsally above the urethra for a distance of about 2 cms. and above and posterior to the bladder for a distance of about 1½ cms. This outpouching is 2 mm. in diameter.

Case 3. W. M., male, black, age 15 days. Weighed 4 lbs. 10 oz. at birth. Gained to 4 lbs. 15 oz. in first 4 days and remained at that weight.

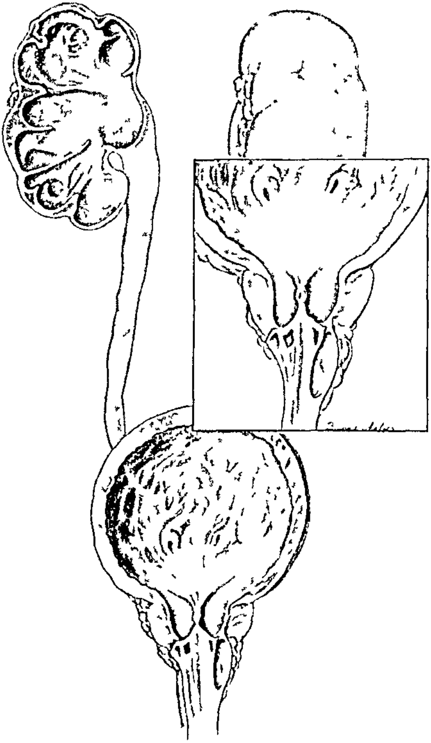

Fig 2 A typical arrangement of type 1 is demonstrated in case 2 Note the abnormal position of the ureteral orifices with associated dilitation of the ureters and kidney structures

On the eighth day the abdomen was firm The child was irritable and appeared malnourished in spite of weight gain Urination of small amounts was accomplished with considerable straining The abdomen remained large The child was catheterized on the 12th day and 70 cc of clear urine was removed Following catheterization the patient was comfortable On the 13th day small amounts of urine were voided The abdomen was still firm and gave the impression of a mass in lower abdomen, below umbilicus On the 14th day, the abdomen was markedly distended The child was catheterized and 200 cc of concentrated urine was removed The urine was slightly bloody Blood urea nitrogen was 80 on the day of his death.

Autopsy revealed Congenital valves of the posterior urethra type 2 The valves appeared as thickened fibrous bands extending from the verumontanum to the outer margin of the vesical orifices (Fig 4). The bladder was greatly thickened, and dilated The ureters were greatly enlarged and tortuous. The renal pelves and calices were greatly dilated. There was considerable thinning of the renal parenchyma.

The original description of the condition is lost in obscurity. However, Morgani, in 1717 is credited with having presented the first anatomical description of this anomaly, al-

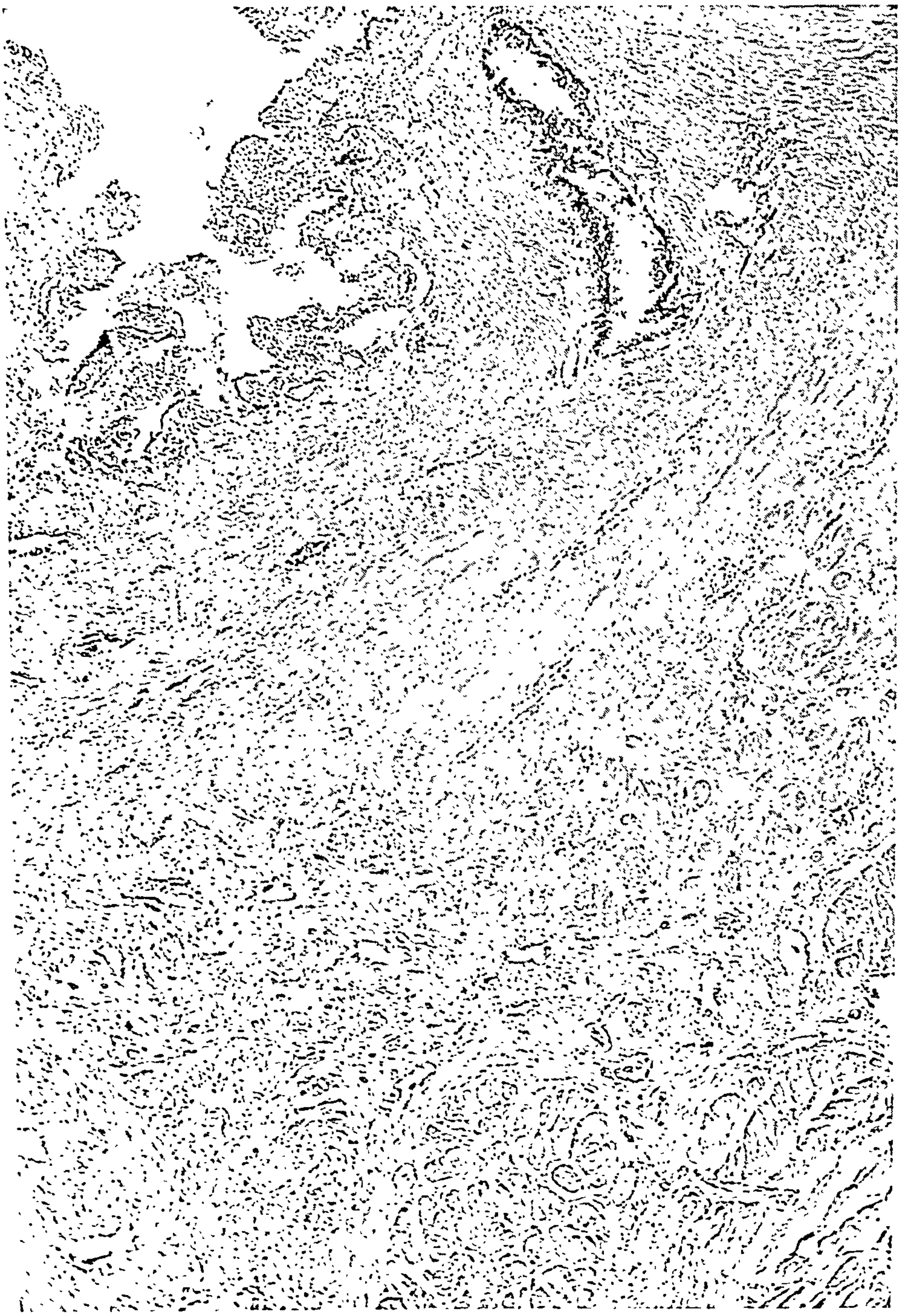

Fig. 3. Photomicrograph of valve leaflet. The low-power view shows that the valve is composed of collagenous fibrous tissue, which is moderately edematous. It is poorly vascularized, although toward one edge there is a dilated vessel surrounded by inflammatory cells. There is an indistinct covering of flattened and low cuboidal cells.

though the case report could not be found for verification Langenback is credited with having described the pathological findings in 1802 Guthrie and Velpeau working independently reported in 1832 the effects of the urethral obstruction on the upper urinary tract The first clinical recognition of the anomaly was reported by Eigenbrodt in 1891 Young, in 1912 first observed cystoscopically the formation of congenital valves and in 1913 he was the first to treat the condition surgically Since Young's original work numerous surgeons have been able to apply the surgical principles outlined by him with satisfactory results

Young classified valves of the posterior urethra into three types (Fig 5) Each type was classified according to the relationship of the anomalous leaflets to the verumontanum The most frequently observed type of congenital valve is attached to the anterior end of the verumontanum and extends to the lateral walls of the urethra (Type 1) Extension of the valve leaflets from the posterior margin of the verumontanum to the bladder outlet is also described (Type 2) Another type (Type 3), may be totally independent of the verumontanum occluding the urethra as a partial or complete diaphragm or iris and may be situated either anteriorly or posteriorly to the verumontanum in any site of the prostatic urethra There are many variations in the structural position and contour of congenital valves producing infravesical obstruction An extreme variation of type three was observed in one of the cases presented Case 1 (Fig 2)

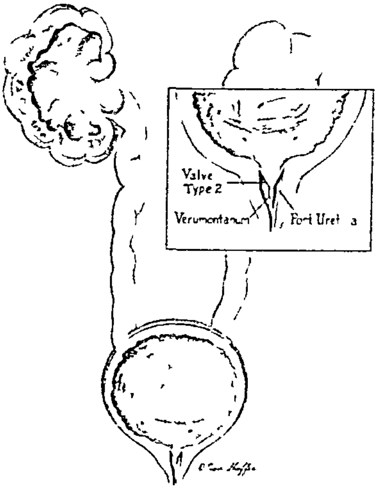

Fig 4 The autopsy findings of a 15 day old infant dying of uremia Note the formation of the valve leaflets in a classical type 2 formation

In this case the urethra penetrated through the verumontanum to open on its superior surface within the dilated posterior urethra. The hypertrophied verumontanum was located on the floor of the greatly dilated posterior urethra. The urethra was completely closed anteriorly. An instrument introduced through the urethral meatus would pass into the dilated posterior urethra through the sinus in the verumontanum.

ETIOLOGY

The etiology of congenital valves of the posterior urethra is unknown. There are several theoretical etiological suggestions but none of the apparent explanations accounts for all types of valve formation. The explanations most often discussed are four in number.

1. Tolmalschew believed that the valves are due to enlargement or modification of the folds and ridges normally present in the prostatic urethra.

However, as pointed out previously by other investigators, hypertrophy of the folds and ridges normally found in the urethra could account for types 1 and 2 but not for type 3. It is highly probable that the influencing factors of such anomalous formations are not always the same due to the wide variations of contour and position and construction of the valves.

2. Bazy believed that congenital valves were due to the persistence of the urogenital membrane.

3. Lowsley believes the valves are due to the anomalous development of the Wolffian or the Mullerian ducts.

4. Watson believed that they are due to attachment or "fusion of the tip of the colliculus to the roof of the urethra."

It may be seen that there exists no unanimity of opinion as to the etiological factors productive of these anomalous formations. Regardless of the etiology or the type of formation, the symptomatology presented by patients having such an anomaly is that of definite infravesical obstruction.

PATHOLOGY

The congenital condition of the posterior urethra is that of deep folds of tissue covered with mucous membrane. The pathological changes of the posterior urethra are those of dilatation behind the obstruction with varying destructive changes in the upper urinary tract. *The formation of these cusps* is such that instrumentation or catheterization is readily possible yet due to structural contour of the leaflets definite impediment to normal urinary flow results. With the iris type (Type 3), complete obstruction to instrumentation is usual. In this type the fenestra or opening may be so minute that even the introduction of a filiform bougie is impossible. It is believed that Case 1 of our series is a variation of this type, although the introduction of instruments was readily accomplished.

Unfortunately the pathological changes of the urinary tract are not limited to the posterior urethra. As the result of obstruction the posterior urethra becomes dilated. The bladder wall, early in the progress of the disease, shows hypertrophy with extensive trabeculation and inflammatory change. The increasing back pressure, as the bladder fails to overcome the resistance of the valves, causes dilatation of the ureters and renal pelves eventually producing bilateral hydroureter and hydronephrosis. The weight of the dilated ureter causes it to sag resulting in folds, kinks and angulations. Ureterovesical incompetency permits back pressure to be exerted directly on the renal parenchyma. Infection is inevitable. It has been repeatedly demonstrated and it cannot be overemphasized that stasis of urinary flow is the most frequent predisposing cause of infection. In the presence of congenital urethral valves, stasis of urinary flow and residual urine are apparent from the time of the first urination, so that infection invariably and inevitably becomes an important factor of the condition.

The life expectancy of patients with valve formation is usually short and is generally considered to be under 10 years. The pathological changes in the infant urinary tract may be so extreme in utero that death results at birth or shortly after birth as shown in one of our cases (Case 3). However, the manifestation of posterior valves may not become evident or too serious in extent until later in life. The age of one of our cases was 19 and presented a history of urinary disturbance beginning in early childhood.

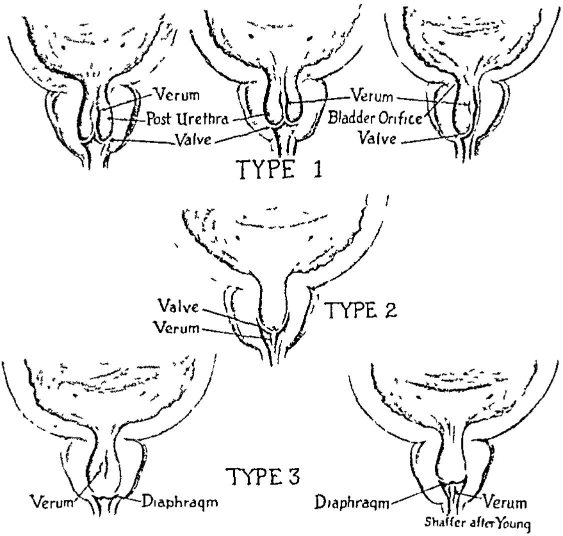

Fig 5 Valves of the posterior urethra as classified by Young into 3 types. Type 1 is the most frequently observed type The leaflets in this type are attached to the anterior end of the verumontaum In type 2 the leaflets extend from the posterior margin of the verumontanum to the bladder outlet Type 3 is described as a partial or complete diaphragm which may be situated either anteriorly or posteriorly to the verumontanum.

SYMPTOMS

The symptoms of posterior urethral valves are not always definite but are always suggestive. Any one of four symptom complexes may predominate: (1) Urinary disturbance, (2) urinary infection, (3) renal insufficiency, and (4) gastro-intestinal symptoms.

1. Urinary Disturbances: Frequency of urination is the most common symptom and is usually present from birth. Frequency of urination may become more intense as infection intervenes and increases.

Urinary dribbling or paradoxical incontinence becomes evident as the chronic retention is established The distended bladder may be distinctly palpable suprapubically. In one of our cases, (Case 1), an elongated protuberance extended to the level of the umbilicus and was first thought to be a cyst of the urachus. As the chronic retention continues, the patient is continuously wet and may be considered as having eneuresis. Campbell cites nine cases that were considered as having eneuresis, but which were proven on study to have valve formation.

Difficult urination or dysuria is common and results from the obstruction produced by the valve formation. The small, hesitant, dribbling urinary stream passed with difficulty and straining is usually apparent and is a pertinent symptom of congenital valves of the posterior urethra.

Pain is frequently manifested by the crying, straining infant during urination. The chronically distended bladder produces lower abdominal pain as pressure by the abdominal muscles is increased in an attempt to urinate. Pain in the loin frequently occurs as the result of ureteral and pelvic dilatation and distention which is so frequent as the condition advances. Pain in the renal area during urination is suggestive of ureteral reflux and is a symptom not infrequently observed. It is due to the increased intrapelvic pressure through the widely dilated and incompetent ureterovesical sphincter at the time urination is attempted.

Hematuria, although not constant, may occur in varying amounts and should be regarded as an important symptom should it occur.

2. Urinary Infection: Infection of the urinary tract is inevitable and may be expected in every instance of posterior valve formation. Chills and fever with increased urinary frequency are common. The stasis of urinary flow and the dilated atonic ureteral and vesical muscular mechanisms are ideal factors favoring infection. In review of the histories of cases in the literature and those personally observed "chronic pyelitis" or "recurrent pyelitis" was commonly noted. The urine cultures of the cases reported were not unusual but rather those organisms commonly seen in urinary tract infection were isolated.

Acute accerbations of the urinary tract infection are common in the presence of acute upper respiratory infection. Following subsidence of the acute phase of the accerbation pyuria exists and remains in spite of medicinal therapy.

3. Renal Insufficiency: Renal insufficiency occurs in varying degrees as the destructive renal processes advance. As renal function diminishes, the signs and symptoms of toxic absorption increase. Blood urea nitrogen retention is increased and phenolsulphonphthalein excretion is diminished.

The clinical picture presented is not unlike that seen in advanced prostatism of later life. As the renal function continues to diminish the symptoms of uremia become apparent. Unless relieved, death is inevitable. If renal destruction is great it is doubtful that more than paliative or temporary restitution can be accomplished by any means or procedure. However, if corrective treatment is instituted early it has been most conclusively demonstrated that normal advancement of life and growth may be expected in some instances, although generally the condition presents a grave prognosis.

4. Gastro-Intestinal: Symptoms referable to the gastro-intestinal tract are common and may be extreme. Anorexia, nausea, vomiting, constipation or diarrhea are frequently seen. These symptoms may be so intense as to overshadow the urinary symptomatology.

Kretchmer and Pierson cited a case which was examined after death following pyloroplasty in which all symptoms during life were gastro-intestinal. Campbell cites another case in which constipation was extreme and resulted from compression of the rectum by the distended bladder. Failure to gain weight or even continued loss of weight presents a definite problem of management particularly during infancy and early childhood. The individual 19 years of age herein reported as Case 2 was noted to be small, stunted, and frail in stature with an unstable gastro-intestinal tract and a "picky" appetite and was also subject to frequent attacks of upper respiratory infection.

DIAGNOSIS

The diagnosis may be difficult or confusing. Complete urological examination offers the only possibility of establishing an accurate and true diagnosis. A complete urological study of the correlation of a carefully elicited history, physical, roentgenological and cystourethroscopic examination. Differential diagnosis must exclude hypertrophy of the verumontanum, fibrosis of the vesical neck, neurogenic bladder, chronic nephritis and polycystic disease of the kidney. The history of difficult, painful urination or straining at urination which has existed is usual and the distended bladder may be readily palpable.

In all three of our cases the distended bladder was palpable suprapubically. The kidneys and ureters may be palpable in advanced cases. Young and also Campbell have reported having palpated a greatly dilated ureter.

Roentgenographic studies offer visual evidence of the pathological changes in the urinary tract Intravenous urography may or may not offer evidence of disease This is particularly true in advanced renal destruction when the kidneys are unable to excrete sufficient contrast medium for visualization Visualization of the entire urinary tract is usually accomplished at the time of cystography

The cystograms usually reveal an irregularly enlarged bladder The upper urinary tract on one or both sides is usually outline by reflux of the radio opaque medium through incompetent uretero vesical sphincters The characteristic funnel shaped dilation of the bladder outlet and posterior urethra extending to the obstruction is usually evident Retrograde pyelography is seldom necessary in the presence of such concrete evidence demonstrated during cystography

CYSTOURETHROSCOPIC EXAMINATION

Cystourethroscopic examination is usually a relatively easy procedure and assures definite informative data of the presence of congenital valves The characteristic pathologic dilatation of the posterior urethra readily permits visualization The valves or cusps may be observed as the irrigating medium is permitted to flow through the instrument into the urethra As the cystoscope is advanced, the greatly dilated vesical orifice may be observed

Further observation of the bladder reveals the trabeculated wall, the presence or absence of diverticula or calculi and the usually widely dilated ureteral orifices may be noted Difficulty of observation may be experienced In Case 1 of our series, the cystoscope entered the greatly dilated posterior urethra at a very acute angle through a sinus which penetrated the verumontanum, the intra ureteral ridge was so markedly hypertrophied that visualization of the bladder was impossible However such difficulty of examination is exceptional if the urethra will admit the passage of the cystoscope

TREATMENT

It is imperative that slow decompression be done and stabilized urinary function is established before any surgical procedure is contemplated Continuous catheter drainage is to be preferred to cystotomy although the latter procedure may be instituted because of the difficulty of retaining a catheter in the very young Preliminary drainage may of necessity be continued for days, weeks, or even months until renal function returns to normal or approximately normal Following stabilization of the urinary function, destruction of the valves and relief of the obstruction may be done Transurethral destruction may be accomplished by suprapubic approach Following destruction of the valves and the elimination of the obstructing factors, careful, meticulous pediatric feeding and observation are necessary as the prognosis greatly depends on the extent of renal damage and the patient's ability to assimilate the food given him

SUMMARY

Congenital valves are undoubtedly not as infrequent as the sparsity of cases would lead us to believe Obviously every male child with eneuresis is not a behavior problem nor is every instance of "pyelitis" an isolated infection of the kidney However, every male child suffering with urinary difficulty, eneuresis or chronic infection of the urinary tract should be given the benefit of complete urological examination The diagnosis of congenital valves is confirmed by cystourethroscopic and roentgenological examination

RIASSUNTO

Valvole congenite non sono cosi' rare come si potrebbe dedurre dalla scarsita' della letteratura sull'argomento Ecco perche' l'A ritiene che ogni bambino affetto da disuria, di enuresi o da infezioni croniche delle vie urinarie debba essere sottoposto ad un completo esame urologico La diagnosi di valvole congenite viene confemata da un controllo cisto uretroscopico e radiografico

SUMARIO

Las valvulas congenitales de la uretra posterior indudablemente no son tan raras como la esparcidad de los casos lo hace a uno creer asi Indudablemente no todos los casos de eneuresis en el muchacho son problemas sicologicos ni tampoco son todos los casos de pielitis casos isolados de infection renal Sin embargo todos los muchachos que sufren de dificultades de la micturicion, eneuresis, e infeccion cronica del conducto urinario deben de darseles el beneficio de un examen urologico completo. El diagnostico de valvulas congenitas se confirma generalmente por la cisto-uretroscopia y la radiologia.

SOMMAIRE

Les valvules congénitales ne sont pas aussi rares que l'on croit. Naturellement, chaque enfant mâle ayant de la difficulté à uriner et chaque cas diagnostique "pyelitis" n'est pas une infection isoleé du rein. Néanmoins chaque enfant mâle ayant de la difficulté à uriner ou présentant une infection chronique de voies urinaires, doit avoir le bénéfice d'un examen urologique complet. Le diagnostic des valves congénitales est confirmé par un examen cystouréthroscopique et roentgénologique.

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CORRECTION

The article appearing under News Notes, on page 204 in The Journal of the International College of Surgeons, No. 2, 1949, should have read as follows:

> Professor Dr. Manuel A. Manzanilla, of the Faculty of Medicine of the University of Mexico, was presented with the decoration of the National Order of Merit, "Carlos J. Finlay," which was conferred upon him by His Excellency, the President of the Republic of Cuba.

The Role of Ultraviolet Blood Irradiation Therapy* *Knott Technic* in Surgery

R C OLNEY, M D, F I C S**
LINCOLN NEBR

ONE of the valuable contributions to medicine in recent years has been the development of the *Knott Technic* of ultraviolet blood irradiation therapy

To date there have been published some thirty articles dealing with the subject, as a result of over 60 000 treatments given throughout the United States in the past 15 years with no deleterious effects having been noted

This procedure involves an entirely new principle in the application of ultraviolet ray for therapeutic purposes and in order to present the subject clearly and concisely, I have chosen to discuss it in the following manner

First, what is it? Second, how does it act? Third, what are its uses? These are the usual questions asked

WHAT IS IT?

After many years of intensive work Knott discovered a new and extremely valuable phenomenon, which is that a definite short exposure of selected ultraviolet rays properly *impinged upon a definite amount of the patient's blood* produces certain reproduceable reactions which combined, greatly increase the patient's resistance

The result of this procedure is not the sterilization of the blood by the bacteriocidal action of ultraviolet ray, but the marked stimulating effect upon the resistive forces of the patient which is vastly more valuable

This method of applying ultraviolet rays to the blood and the amount of blood so exposed to the rays, and the time factor of such exposure has been carefully worked out and reduced to a scientific formula, that when used according to the formula, reproduce within the patient certain definite reactions

This procedure in its entirety has become known as the *Knott Technic* of ultraviolet blood irradiation

It consists of the withdrawal and citration of an exact amount of the patient's blood which is 1½ cc per pound of body weight This citrated blood is then returned to the patient through the Knott Hemo Irradiator a precision machine which automatically exposes the blood to ultraviolet ray at close range at the rate of 10 cc in 10 seconds, with a turbulent movement of the blood column so that each particle of blood is exposed only for a fraction of a second

The blood returns immediately to the patient through the same intravenous needle through which it was withdrawn

The time required for this procedure is about 15 to 20 minutes

HOW DOES IT ACT?

Application of ultraviolet blood irradiation in accordance with the *Knott Technic* produces within the patient certain definite reactions consistently

A An increase in the oxygen factor of venous blood as determined by the Van Slyke Technic (G P Miley and others)

A long series of cases of known low venous oxygen values were treated and there was found a consistent rise in venous oxygen values ranging from 50 percent to as high as 300 percent

(The oxygen increase was verified by experiments carried out by the United States Naval Air Service in a low pressure chamber study of anoxia and bends susceptibility)

The value of a safe method of effecting and maintaining an increase in oxygen exchange factor in the blood stream of a patient is well known

B A rapid rise in the opsonic index

Following treatment the phagocytic action of polymorphonuclears is markedly increased

The original work showed an increase up to 50 percent in the number of bacteria ingested in the cell

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* Presented at the Thirteenth Annual Assembly of the United States Chapter of the International College of Surgeons St Louis Nov 15-20 1948

** President American Blood Irradiation Society

Later work performed by M. A. Sullivan and Morton Beroza have established the increase in bacterial ingestion from 38 percent to 78 percent.

Such an increase in the opsonic index of blood is valuable in the treatment of infections.

C. Vasodilatation and increased capillary flow.

There is marked evidence of peripheral vasodilatation.

D. There is a profound effect upon toxic patients with relief of toxic symptoms.

This phenomenon is most consistent.

E. Chylomicron studies in critically ill patients show rapid return of brownian movement.

F. Extensive tests of the effect of short-time irradiation on blood and biochemical compounds have shown that beneficial alteration chemically of certain important constituents of the blood take place following exposure by the *Knott Technic* of ultraviolet blood irradiation, e.g., adrenalin, dihydroxyphenylalanine, cysteine hydrochloride, glutathione and ergosterol.

WHAT ARE ITS USES?

Wherever increased blood oxygen, increased phagocytosis and vasodilatation will benefit a patient, this therapy is useful.

Its uses in medicine are just as important as those in surgery, but this discussion is confined to its role in surgery.

In using this one must continually keep in mind the fundamental effects of this therapy as a valuable supportive measure, and not think of it as applied to certain diseases as a specific therapy.

This is one of the most valuable aids in handling serious surgical cases. Our experience covers over 800 patients so classified.

There is marked reduction of swelling and pressure in affected parts, with relief of pain and rapid restoration of function in the affected organs.

In general peritonitis and postoperative ileus, with the patient cyanotic, rapid pulse, greatly distended, vomiting, no bowel action from any means, if ultraviolet blood irradiation is given, the cyanosis is relieved promptly, intestinal tone is rapidly regained, and in from four to twelve hours the patient will usually have three or four defecations and elimination of large amounts of flatus, will stop vomiting, the distention is relieved, and the abdomen becomes soft.

If this result is not obtained and the patient proves to have a mechanical obstruction, the abdomen should be opened. Following this treatment the patient's general condition is greatly improved and this surgical attack can be done with much greater safety.

Patients with an acute surgical abdomen, such as ruptured ulcer, acute severe gallbladder disease, acute severe pancreatitis, and similar conditions, when given this therapy at once, rapidly begin to show relief of serious symptoms.

Then if desired, the patient may be operated immediately and the operative attack is withstood much better.

The treatment should be repeated the day after surgery.

If preferred, after the first treatment the patient may be watched for a few hours, and in cases in which there is not a ruptured viscous, appendicitis, or such an obvious acute surgical emergency, the acute symptoms will begin to subside rather rapidly, and in the case of the acute gallbladder or acute pancreatitis, etc., the patient may be spared an operation.

In gallbladder disease this therapy is extremely valuable. My own series covers over 400 cases.

The problem of the acute gallbladder is greatly reduced, since in patients with acute severe gallbladder disease, in most cases symptoms will subside rapidly, vomiting cease, and the critical attack will be rapidly averted. There is reduction of swelling and pressure in the biliary ducts—promoting drainage. If necessary, later, the patient may or may not have an operation.

If symptoms do not subside in two or three days, the patient with a gangrenous gallbladder or an impacted stone with gangrenous duct may be operated on immediately, and it is surprising how well these patients withstand this surgery, having blood irradiation before the operation. Usually cholecystectomy can be performed instead of cholecystostomy.

Patients having had the gallbladder removed, who continue to have biliary attacks with pain, vomiting clay colored stools, etc , although on good medical and dietary management, will get complete relief in most cases by ultraviolet blood irradiation therapy in addition to the medicine and dietary treatment I have had over 100 such cases of from two to 25 years duration with complete relief of symptoms in 90 percent

In non specific pelvic infection or cellulitis, both acute and chronic, this has proven to be of great value I have had over 600 patients in this group

In acute severe, pelvic cellulitis and puerperal sepsis patients respond promptly with marked relief of pain, swelling and temperature, and recovery is hastened in most instances without surgical drainage

In chronic pelvic infection or cellulitis patients with massive inflammatory disease without definite abscess or cyst improve markedly with this treatment

The swelling, pain and tenderness disappear and in a reasonably short time most of these cases return to normal

Severe lymphangitis, adenitis, and cellulitis respond promptly with rapid reduction of pain, redness and swelling and without localization and surgical drainage in many cases

In many postoperative complications such as postoperative pneumonia, atelectasis and embolism, the supportive effect of ultraviolet blood irradiation is a very valuable adjunct

There is marked relief of pain and cyanosis with a rapid stimulation of the general resistance of the patient

Thrombophlebitis and phlebothrombosis likewise respond remarkably to this treatment with relief of pain swelling, and a rapid resolution of the process without embolism in a high percentage of cases

The ideal method of using this therapy in *elective* cases requiring serious surgery, such as total hysterectomy, serious biliary surgery, is to give the treatment before and after operation

Sometimes two or three treatments in the two, three or four weeks before operation

Usually, however, one treatment the day before and one the day after surgery

When so handled these patients seldom vomit, *rarely require suction drainage of the G I tract*

The abdomen is seldom distended

Patient usually expels flatus without assistance

They are seldom toxic move and turn easily, require less opiate, I V fluids, and transfusions

Valuable gastric and duodenal secretions are retained and electrolyte and fluid balance is easily maintained

Complications such as thrombophlebitis, phlebothrombosis, embolism pneumonia, etc , are greatly reduced and if they occur, are greatly benefited by ultraviolet blood irradiation therapy

Mortality and morbidity are greatly reduced

SUMMARY

In conclusion, it is important to emphasize that the *Knott Technic* of ultraviolet blood irradiation is a valuable supportive measure, the effects of which are the marked stimulation of the resistive forces of the patient and not a specific therapy

These effects are 1 Increased blood oxygen 2 Increased phagocytosis 3 Vasodilatation

In all of our work we have used control cases as nearly as possible in all series, selecting cases as nearly identical to those treated, for control purposes

RIASSUNTO

L'irradiazione del sangue con raggi ultravioletti (tecnica di Knott) non rappresenta una terapia specifica, ma ha principalmente lo scopo di aumentare le difese organiche del paziente Gli effetti del sangue irradiato consistono in un'aumentata ossigenazione del sangue, in un'accresciuta fagocitosi, in una vasodilatazione Per definire meglio gli effetti terapeutici, l'A ha selezionato casi di controllo quasi identici a quelli trattati

SUMARIO

En conclusion, la terapeutica por irradiacion ultravioleta de la sangre segun el metodo de Knott, es de valor como medida suportiva Su efecto es el estimular los poderes de resistencia del paciente, y por lo tanto no es terapeutica especifica

SOMMAIRE

En conclusion, il importe de comprende l'utilité de radiation ultra-voilette du sang (Knott technique) et d'en peser les grands avantages. Ces irridations augmentent la résistance du malade.

Ce n'est pas un traitement spécifique.

Il produit une augmentation:

1. De l'oxygène dans le sang.
2. De la phagocytose.
3. De la vasodilatation.

Dans tous nos ouvrages, nous avons employé des cas contrôlés aussi proches que possible des cas aussi identiques que ceux que noux traitions.

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Atrophy of the Vaginal Mucosa
A Clinical Study of Thirty-Eight Cases*

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ACCORDING to Robert Myer, as quoted by Novak[1] the vaginal epithelium is no longer considered as part of the mullerian system still it is clearly under the influence of the ovarian hormones. Atrophy of the vaginal mucosa almost always results from ovarian deficiency and a good example is found in the so called senile vaginitis. As will be shown later atrophic changes of the vaginal epithelium may take place during any period of a woman's life and is by no means limited to the senile.

Atrophy of the vaginal mucosa thus far has been discussed little for manifold reasons. In the first place as a sign it is frequently over shadowed by other important findings, so much so that in the discussions of such clinical entities as Simmond's disease, atrophy of the vaginal mucosa is scarcely touched upon, although in some such cases genital atrophy may not even take place[2]. Secondly, uncomplicated atrophy of the vaginal mucosa usually causes little or no symptoms. Thirdly, sporadic cases of senile vaginitis do not seem to arouse much interest as we almost always take it for granted that the picture is just what we would expect of that age. Actually atrophy of the vaginal mucosa deserves more attention than it has been hitherto given and is as will be shown later, helpful to the gynecologist in many ways.

During the last six years the writers devoted quite some time and effort to make periodic observations on patients with atrophic changes of the vaginal mucosa, and followed them up for periods varying from three to five years. Altogether 38 cases were studied, those that have failed to reach this time limit have all been discarded.

CLASSIFICATION

From the clinical viewpoint, atrophy of the vaginal mucosa can be divided into four groups. The post partal the premenopausal the senile or post menopausal and the artificial which includes both surgery and irradiation. A fifth group may be added that is atrophy following debilitating diseases or poor nutrition only they are much in the minority. The distribution of the cases is shown in Table 1.

TABLE 1

Type of Atrophy	Post Partal	Premenopausal	Senile	Artificial Surg	Artificial Irrad
Number of cases	19	8	6	2	3

CLINICAL OBSERVATIONS

As far as the local changes are concerned all groups present more or less the same picture. We shall first proceed with the general picture of atrophy and point out the minor differences in the discussion of the separate groups.

The earliest sign of atrophy of the vaginal mucosa is a smooth and pale outlook of the whole canal which may be devoid of rugosae especially over its upper third. This is soon followed by the appearance of submucous red patches (telangiectatic spots), first over the portio vaginalis of the cervix then the upper part of the vagina. These spots are found most frequently in the premenopausal and senile groups. There are no cracks over these spots, the overlying mucosa being intact. In the senile group red streaks and cracks may be found over the fornices.

When the upper vaginal canal and the cervix are smeared with Lugol's solution (Schiller's test), one may see over the uniformly mahogany stained cervix and upper vagina, in contrast greyish white, oval shaped patches that fail to take up the stain.

The mucosa covering these patches appear intact. The patches may become confluent and are located mainly over the posterior cervical lip and the posterior fornix. The epithelium over the telangiectatic spots, on the other hand, takes up the stain, and if one waits long enough, these spots may stand out darker than the rest of the parts. This contrast in stain takes place most vividly in the premenopausal group, but is not present in every case.

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As time goes on the vaginal canal gradually *yet definitely narrows down, with its walls* ever increasing in rigidity. Thickening takes place mainly in the submucosa; the fornices, especially the posterior one, quickly shallow out.

SEPARATE CONSIDERATIONS

The Post Partal Group: Most of the patients in this group came to us rather late. The earliest patient was one and one half years, and the latest, seven years after parturition. The whole genital tract, including the vulva, appears atrophic and the uterus is either super or hyperinvoluted. The vaginal canal is narrow and in some cases it may feel like a rigid tube. Telangiectatic spots, red streaks or cracks over the mucosa are not common. However, when the mucosa is pressed hard with the vaginal speculum, spotted submucous hemorrhages may be seen. Severe cases are usually associated with superinvolution, the cold syndrome, etc., the classical picture has been well described by Sheehan and McLetchie.[3] The vaginal canal narrows down rather quickly and in less than three years' time (after parturition) coitus may become impossible. Finally the whole canal becomes a rigid narrow and fairly straight tube, further trauma such as from coitus and friction does not seem feasible, and coalescence is rare.

In the mild forms the patients show little or no signs of endocrine disturbance other than amenorrhea and the uterus may be only slightly hyperinvoluted. The vaginal canal narrows down only very gradually and rigidity is not marked. The atrophied mucosa however, is constantly exposed to trauma from coitus and frequently rubbing of the walls against each other at the mid or lower portion of the vagina where approximation is easy. Coalescence may often be the end result.

A typical history of this group, including both mild and severe forms, is prolonged and continuous amenorrhea years after a childbirth. The labor may or may not have been difficult, but the patient had either suffered from much blood loss or else the puerperium was febrile and stormy. The patients are usually young, and the clinical pictures they present are pathetic. Table 2 shows the age distribution between the two forms. Three of our severe cases fitted pretty well with the clinical picture as described in detail by Sheehan and McLetchie, but none of the patients showed any crisis of attack that these authors described in their report.

TABLE 2

	Number of cases	Age					
Severe	5	36	23	22	26	23	
Mild	11	28	25	21	23	23	35
		30	35	29	26	38	

A somewhat allied group is marked by ever increasing obesity following childbirth, with infrequent menstruation. The uterus may be undersized but the vaginal canal appears only slightly atrophic. This group is not included in our study.

Atrophy After Prolonged Dystocia: Neglected cases of dystocia, where the fetal head has been kept in the vagina for days and the whole birth canal extensively damaged by fruitless instrumentation or manual manipulation, may result not only in marked atrophy of the vaginal mucosa but also a bizarre derangement of the anatomy of the pelvic organs. This type of atrophy has a much better prognosis once it escapes the fate of the above mentioned forms, which it usually does. It rarely lasts more than eight months.

Occasionally one may pick up a case of fairly marked atrophy of the vaginal mucosa during a routine post partal examination, mindful, of course, of the usual degree of atrophic changes during the first few weeks post partum. The cause for atrophy in such cases is obscure, and the picture improves readily with estrogens. Table 3 shows the factors that may lead to post partal atrophy and the distribution of our cases therein.

TABLE 3

Infection	9
Hemorrhage	4
Tuberculosis	1
Poor nutrition	1
Damage from prolonged dystocia	1
Unknown	3

Atrophy During Lactation This form of atrophy is also associated with amenorrhea so long as lactation continues. Once the patient stops nursing her baby the atrophic picture *immediately improves. Should lactation* be prolonged for more than two years which is not uncommon in China, atrophy will remain more or less stationary that long. What usually happens however is that after four to six months of lactation menstruation returns and the woman may keep on nursing her baby for a few additional months. The relationship between lactation and genital atrophy is a rather vague one.

The Premenopausal Group This group is so named for want of a better term. Most of the patients in this group have passed their 40th year, thus approaching menopause. The vaginal canal is neither rigid nor narrow. Atrophy of the vaginal mucosa though less marked, is definite. Red patches (telangiectatic spots) are common but there are no cracks. These spots are located mainly over the cervix and upper vagina, seldom the lower third. Trauma from coitus or friction between the walls does not seem to have much effect on the integrity of the mucosal surfaces. There is no tendency toward coalescence. The patients usually come in with a bloody vaginal discharge and the clinical picture is that of slight atrophy plus some mild infection.

In the senile group the vaginal canal is narrow and shrunken, the mucosa may be smooth and shiny. Rigidity of the walls is less marked, and the canal is usually half plugged by either a cystocele or a rectocele or both. Linear cracks or red streaks may appear anywhere in the vaginal canal but they do not seem to have the same appearance as the telangiectatic spots found in the premenopausal group. Bleeding occurs on the slightest trauma from the vaginal speculum. The uterus is always small. Table 4 shows the age distribution among the premenopausal and senile groups in our series.

TABLE 4

Group	Age							
Premenopausal	44	50	47	41	37	42	47	43
Senile	66	74	51	54	71	75		

The atrophic picture following irradiation or surgery would seem to depend upon the amount of ovarian tissue destroyed or removed. *Following radium application, the* immediate picture is that of an irritation, atrophy does not set in until a few months afterwards. The walls would then gradually become rigid and close in from all sides. Cases of coalescence, apparently from constant friction between the opposite walls before the atrophic picture is complete, have been observed.

Infection and Trauma: Atrophy of the vaginal mucosa if not complicated by trauma and/or infection, may not cause any local symptoms for a long time. Leucorrhea in the absence of infection is uncommon. The predisposing factors to infection are many, among which may be mentioned:

1 The act of coitus which is a constant source of contamination in addition to the trauma it incurs over the already thinned out epithelium.

2 Lowered bactericidal power in the vaginal canal.

3 Constant rubbing of the approximated surfaces against each other. Infection is invariably present in the premenopausal group, but is readily controlled.

Coalescence This usually results from incomplete cornification of the vaginal epithelium and is the natural sequelae to trauma and infection[4] Peculiar enough, it seldom takes place in the premenopausal group wherein atrophy does not seem to play the major role. (This will be discussed later.) As mentioned before, trauma and infection will not have as much effect in the sense of destroying the integrity of the mucosa, as on the other groups.

Beginning coalescence is marked by formation of adhesions between the anterior and posterior vaginal walls at a level slightly below the mid part of the canal, where constant rubbing of the approximated surfaces takes place most readily. Once formed, they can not be broken without tearing off a piece of the vaginal wall, which may cause quite some bleeding. These adhesive bands form almost along the same level but may start at two or three different spots. In about six weeks' time they join together to make the block complete. McLaren also made the observation that after radium therapy stenosis of the upper vagina was common, "occasionally accompanied by a circular occlusive band about two inches from the introitus."[5] In our series three cases in the post partal group and two in the artificial (irradiation) ended in complete coalescence.

The Cervix: The cervix in cases of atrophy of the vaginal mucosa as a rule, is small and free from erosions. The portio vaginalis feels hard and is covered with atrophic mucosa. In the premenopausal and senile groups there may be a few telangiectatic spots.

The Uterus: The uterus in the post partal group is either super or hyperinvoluted and is always amenorrheic. In the premenopausal group it is usually of normal size or slightly larger than normal. Menstrual disturbances such as irregularity, scanty flow and infrequent menstruation are common, rarely the flow may be excessive.

The Ovaries: In the premenopausal group the ovaries may feel cystic, in the rest of the groups they are hardly palpable.

The External Genitalia: Here again the premenopausal group shows the least deviation from normal. The rest of the groups almost invariably show scanty pubic hair and atrophic labia.

THERAPEUTICS

For the severe cases in the post partal group we used a polyglandular extract which contained a bit of everything, according to the labels. The mixture was of unknown potency and was given intramuscularly every other day in 10 cc. doses. This was supplemented with rather heavy doses of thyroid and estrogens. The immediate effect was quite good as far as improvement of the general symptoms such as lack of pep and the cold syndrome, etc. were concerned. Locally, the rigid vagina also loosened up quite a bit. However, there has never been any appreciable change in the size of the uterus and amenorrhea has been persistent all the way through.

For the mild cases of post partal atrophy, administration of the estrogens would enhance cornification so as to enable the mucosa to better overcome the effects of trauma from coitus and friction. In this way secondary coalescence may be prevented.

For the premenopausal group, administration of the estrogens with or without thyroid, never failed to bring the mucosa back to its healthy state. The bloody discharge stopped in a few days, and the cure in most cases seemed to be permanent. As the patients were mostly within the cancer age, and as the estrogens have been suspected as carcinogenic, the drugs were administered with the utmost precaution. Our best guide has been a definite picture of atrophy, preferably with telangiectatic spots.

For the senile group, administration of the estrogens may or may not yield immediate results. The treatment, to be effective, has to be intermittent if not continuous, which is definitely hazardous. Nevertheless, we used the estrogens rather freely on our cases.

We have no experience with the vitamins in the treatment of atrophied vaginal mucosa.

GENERAL DISCUSSION

Hypoovarian function with lowered blood estrogen levels has always been regarded as the logical cause for atrophic changes of the vaginal epithelium. This belief has been strengthened by the fact that in many cases the clinical picture improves rapidly upon administration of the estrogens. This is in general, quite true, but it does not necessarily follow that the incidence of atrophy of the vaginal mucosa should increase with age. Indeed, McLaren[5] stated that the majority of women who have passed menopause retain normal vaginal mucosa. Shute[6] also suggested the possibility of continuation of the estrogen cycle with occasional rises of its level after menopause. Both statements argue for our contention that atrophic vaginitis should not be limited to the senile. As the clinical picture is mainly one of atrophy and it effects women of all ages the same way, there is really no necessity of recognizing senile vaginitis as a separate disease entity

In the post partal group with the most severe forms that are symptomatic of multiple endocrine deficiency, necrosis of the anterior pituitary as evidenced by postmortem findings should rightfully be considered as the etiological factor With the less severe forms, in which the patients show no other symptoms than amenorrhea associated with atrophy of the vaginal mucosa also perhaps a somewhat hyperinvoluted uterus it would be difficult to say whether they are also due to necrosis of the anterior pituitary body but to a lesser degree or to infections that have fatally damaged the uterus and/or the ovaries The fact that infection alone may count for some cases of superinvolution, take for instance, gas bacillus infection as reported by Lennon and Williams,[7] would suggest that the damage may primarily be in the uterus Since necrosis of the anterior pituitary can also take place during pregnancy,[8] one can not leave the anterior pituitary out altogether even in the presence of severe infections The chances are both the anterior pituitary and the uterus may be primarily involved Whether the same can be said of the ovaries or not remains to be seen

It sounds logical to suspect that the cause of atrophy in the premenopausal group might be beginning ovarian failure which would eventually lead to menopause Our observations do not seem to support this view All of the cases responded to the estrogens readily, but continued to menstruate regularly years afterwards In most cases the cure seemed to be permanent and we did not have to keep on with the drug for more than a few weeks either We therefore suggest that in this group infection plays the major role Additional estrogens merely help to restore the normal state of cornification which would render the canal more resistant to the invading organisms That should not take too long

In the senile or post menopausal group certainly the logical cause would again be lowered blood estrogen levels Still senile vaginitis is a comparatively rare disease and if ovarian failure were common after menopause, that is, assuming that the ovaries are still the chief source of the estrogens, we should certainly see more of it The reason why we do not is probably because that in most women who have passed menopause, estrogen supply has not been appreciably depleted That again brings up the interesting question of cyclic ovarian activity after the menopause[6] Such are high probabilities although substitution from the adrenals has been suggested[9] McLaren's studies on the histology of the post menopausal vaginal mucosa and his conclusions thereof, i e, most patients retain normal vaginal mucosa, further support this view The therapeutic effects also seem to indicate that in the so called senile vaginitis the estrogens, wherever they may come from have been appreciably decreased in amount

On the other hand, Shute has pointed out that degenerative vulvovaginitis may be associated with either estrogen deficiency or estrogen excess[6] We have not seen a case of atrophy that failed to respond to the estrogens, which of course, implies that all our cases belonged to the estrogen deficiency group However, it has been our observation that atrophic vaginitis is seldom complicated by vulvitis In some of our cases the vulva appeared wet and atrophic but signs of degeneration and inflammation were wanting Here we must not forget, as Savill[10] has shown, how easily skin lesions over the vulva can be misdiagnosed One should not wonder that many vulvar lesions can be associated with estrogen excess

In case of atrophic vaginitis where the vulva is more or less spared, the assumption may be made that just as the uterus may need more estrogens than the vaginal mucosa for its development and function,[11] the latter might in turn, need more estrogens than the vulva for the same purposes From this we may again infer that in such cases the estrogen level in the blood may become low enough to effect the vagina but not the vulva Such are hazardous conclusions as we know very little about the relationship between the ovaries and the vulva In kraurosis for instance, the best known form of vulvovaginitis, the use of the estrogens is by no means specific Moreover, kraurosis consists of a shrinking process that starts from the vulva and proceeds towards the lower end of the vagina while atrophic vaginitis starts from the other direction. One process seldom extends to the realm of the other. They can hardly have the same cause. It is very likely that the cases described by Shute as degenerative vulvovaginitis are not identical with the pictures of atrophic vaginitis we have studied.

McLaren[11] stated that in case of atrophy the thinning out of the mucosa with added trauma would permit entrance of organisms. It is also our observation that uncomplicated post partal atrophy seldom causes any local symptoms. Leucorrhea in the absence of superficial infection or trauma is rare. Uncomplicated atrophy is usually discovered during gynecological examinations for prolonged amenorrhea following childbirth or during routine post partum check up examinations. In the premenopausal group a bloody vaginal discharge usually brings the patient to the doctor. The discharge comes from increased desquamation in the presence of some low grade infection. The blood stain probably comes from the telangiectatic spots that have broken down, which phenomenon is better observed in the senile variety.

The spotted greyish white patches that fail to pick up the stain in Schiller's test may deserve special comment. These patches have apparently lost their glycogen content. It is well to point out here that this finding is in line with the histology of post menopausal vaginitis as described by McLaren[11] who demonstrated that in such mucosa patches of superficial desquamation of epithelium are present. Intervening areas of apparently normal tissue with abundant glycogen may be seen. On the other hand, as depletion of glycogen is not uniform, this phenomenon might as well be considered as one form of varying tissue sensitivity to the hormones. This is highly conjectural and less likely. Anyhow the patches do not appear to be traumatic in nature. All of our cases that showed up these patches have been amenable to the estrogens. Incidentally, they all belonged to the premenopausal group.

Another interesting finding in this study is that complete coalescence following radium application takes place mainly in the aged. The younger patients seldom develop such a complication. Would it be possible that after the usual dosage of irradiation, the ovaries of the younger patients may possess better power of regeneration? Indeed pregnancy after as much as 2000 milligram hours of radium application has been reported.[12]

Our changed conception of the embryology of the vagina, that is the vaginal epithelium is not mullerian in origin, makes it difficult to understand why coalescence stops at about the level of the junction between the lower third and the upper two thirds. We formerly thought that this level would be where the uterovaginal canal and the urogenital sinus meet, also where the mullerian system ends. This can not be true. The alternative explanation would be that the level mentioned often marks the point of contact between the anterior and posterior vaginal walls and is constantly subject to trauma (friction), which eventually leads to complete coalescence. After atresia is complete, the lower third of the vagina and the vulva though spared in the process, remain atrophic, but the picture does not seem to become worse with time.

CONCLUSIONS

From the above it is evident that:

1. Atrophy of the vaginal mucosa if present, may help to rule out malignancy suspected of patients in the cancer age, when they complain of a constant bloody discharge.
2. Schiller's test, which is often used in the differential diagnosis of early carcinoma of the cervix, when done over the atrophied mucosa may need intelligent interpretation.
3. Early recognition of the condition in routine post partal examinations followed by prompt endocrine therapy will prevent further damages from trauma, infection and the sequelae therefrom.
4. The importance of proper management of labor in childbirth, to insure against excessive blood loss and post partal infections, need not be stressed here.
5. Senile vaginitis should no longer be considered as a separate disease entity.

SUMMARY

1. A study of 38 cases of atrophy of the vaginal mucosa was made.
2. A tentative classification of atrophy of the vaginal mucosa was suggested.

3 The clinical course and the important diagnostic features of each group were presented

4 The etiology and treatment of each were briefly discussed

5 The significance of atrophy of the vaginal mucosa was considered

RIASSUNTO

*Un'atrofia della mucosa vaginale, se pre*sente, aiuta ad escludere una neoplasia maligna nelle pazienti che rientrano nell'eta' del cancro e che accusano una costante secrezione sanguigna La prova di Schiller, spesso usata nella diagnosi precoce del cancro cervicale, richiede un'interpretazione molto accurata se eseguita sopra una mucosa atrofica Un precoce riconoscimento di questa condizione nelle visite post partum, seguito da un'opportuna cura endocrina, puo' evitare ulteriori danni da traumi, infezioni e relative conseguenze La vaginite senile non va piu' considerata come un'entita' morbosa a se'

SUMARIO

Segun los autores la atrofia de la mucosa vaginal cuando esta se presenta ayuda a eliminar el cancer en casos sospechosos La prueba de Schiller debe de practicarce con mayor diligencia, y su *interpretacion* debe de hacerse con mas cuidado en casos de atrofia de la mucosa vaginal Es importante el reconocer tempranamente esta condicion haciendo examenes despues del parto para asi tratarla por la endocrinoterapia No es necesario repetir la importancia que es menester el dar a todas las madres en cinta y durante el parto La vaginitis senil no se debe de considerar como una entidad independiente

SOMMAIRE

Quand l'atrophie de la muqueuse vaginale existe, on peut ordinairement, même si la malade est de l'âge cancéreux ou si elle se plaint d'un écoulement sanguin constant, éliminer le diagnostic de carcinome L'épreuve de Schiller que est souvent employée pour faire le diagnostic différentiel dans le carcinome précoce du col uterin, fait en présence de la muqueuse atrophiée, demande une interprétation intelligente Si on reconnait l'état à temps dans l'examen qui suit la délivrance, on peut à l'aide d'une thérapie endocrine, empêcher des lesions futures dues au trauma, à l'infection et aux séquèles de l'infection *Il importe* de conduire l'accouchement de façon à eviter toute hémorragie excessive et toutes infections puépérales La vaginite sénile ne doit *pas être considérée comme une maladie sé*parée

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The Management of the Rigid Hymen and Perineum Early in Marriage*

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NOT infrequently we are presented with the problem of a rigid, non yielding hymen and perineum in early marriage. Because of its alleged minor importance, it may be relegated to a secondary role in surgical gynecological judgment and management.

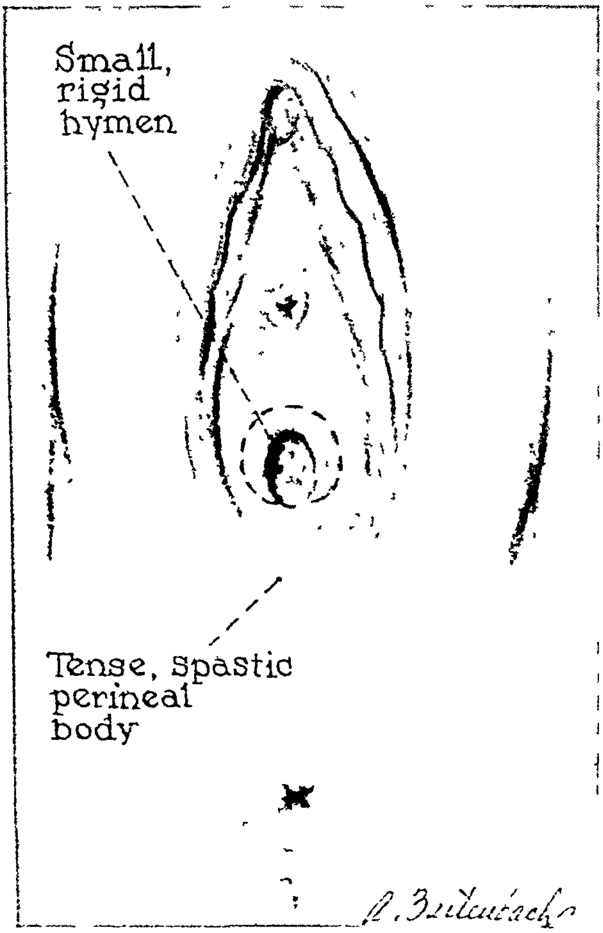

Fig 1. Circumferential excision of hymen.

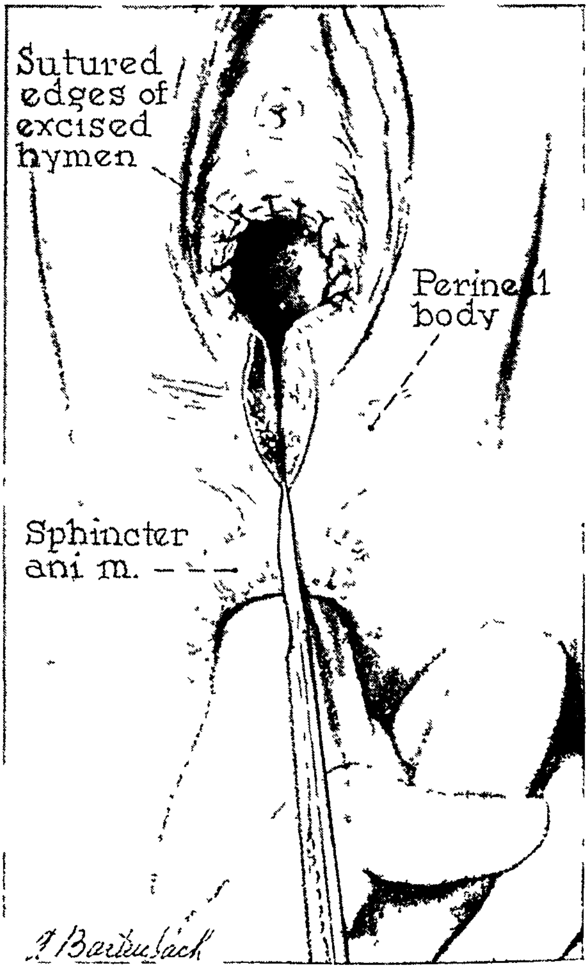

Fig 2 Midline perineotomy with finger in rectum as guide

In the past there were many different methods and various attempts were made to alleviate this condition; such as actual coitus, digital examinations, speculum stretchings with or without anesthesia, hymenectomy and even superficial midline or angle incisions were done, but the complete cure was lacking.

Fortunately with the advent of routine premarital examinations we can often diagnose

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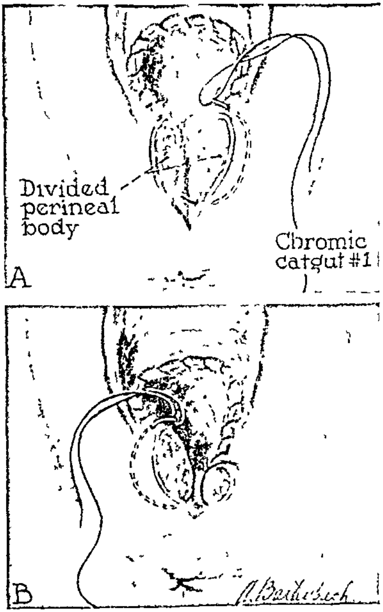

Fig. 3A. Lateral suturing of divided perineal body.
Fig 3B. Lateral perineal body transfixed and tied.

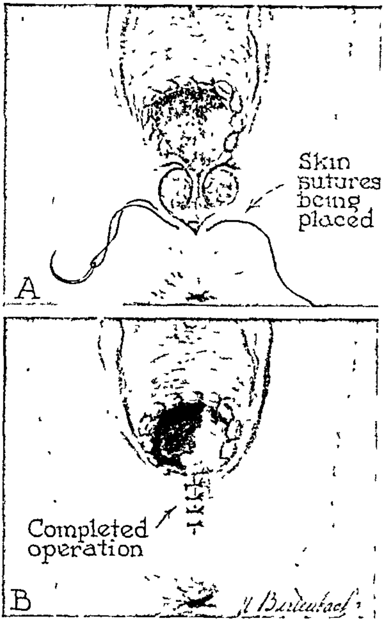

Fig 4A. Skin sutures. Fig. 4B. Note increased size of vaginal introitus

and prognosticate to the patient the probability of dyspareunia or complete inability at coitus However, she is instructed to make a natural attempt at sexual congress, but if it is not fruitful, she should return for further management We feel that by this prophylactic discussion with the patient, the far reaching psycho-trauma with the resultant anxiety and fear neuroses may be avoided, thereby preventing an unhappy married life.

It is our opinion that the management of this problem requires not only a psychiatric and immediate surgical approach, but also an after treatment which is usually not completed until a month or six weeks subsequent to the operative procedure

We appreciate the psychosomatic potentials of this problem, and if our reassurances do not suffice, we refer her for further psychiatric therapy. This paper deals primarily with the surgical restoration to a relatively normal size entroitus of the vagina.

In our opinion the best surgical approach is: a complete circular hymenectomy, and then a midline perineotomy performed with the finger in the rectum as a guide so that the incision can be made with impunity down to the rectal sphincter without injury to this structure. The longitudinal incision is made into the central point of the perineum which is a fibromuscular tendonous mass composed of the constricting muscles of the vagina, transverse perineal muscles, and fibers of the levator ani muscles and crisscross fibers of the anal sphincter.

This longitudinal incision is now sewed transversely with fine chromic catgut and then membrane is sewed to the skin with interrupted fine silk sutures all along the line of the hymeneal excision.

A sulfa pack is inserted into the vagina and is removed in 24 or 48 hours. The patient is permitted early ambulation and one week after surgery, when there is diminishing local edema, vaginal dilatations are started with progressive graduation and are continued twice weekly for approximately a month.

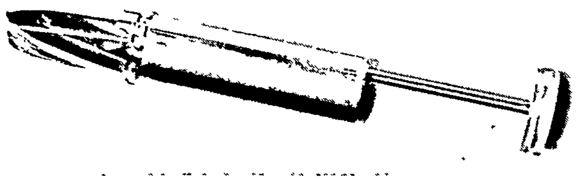

Fig. 5. Photograph of dilator with the blades closed.

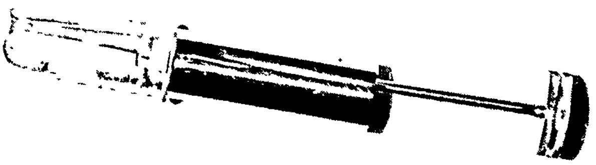

Fig. 6. Photograph of dilator with large latex finger cot over the blades.

We have suggested a dilator which is more symmetrical than a speculum and seems to give a more even and circular distribution to the area which is to be dilated.

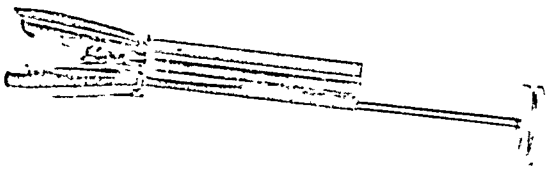

Fig. 7. Photograph of the dilator with the blades open.

A month or six weeks after the operative procedure, normal coitus can usually be enjoyed with little if any evidence of the accompanying vaginismus.

SUMMARY

The important, but often underestimated subject of the rigid hymen and perineum early in marriage, is discussed with relation to its psychiatric and surgical approach. Emphasis is placed upon the fact that with the finger in the rectum a liberal incision can be made into the perineum without injury to the rectal sphincter.

The after treatment of progressive graduated dilatations is a very integral part of the procedure. A dilator is presented which seems to give a more uniform and symmetrical dilatation. Accompanying illustrations are presented for the purpose of clarifying the subject matter.

RIASSUNTO

L′A. discute questo soggetto, non sufficientemente valutato, sotto l′aspetto psichiatrico e chirurgico. Sottolinea il fatto che con un dito introdotto nel retto un′incisione relativamente ampia puo′ essere eseguita sul perineo senza danneggiare lo sfintere rettale. Segue una dilatazione progressiva con dilatatori atti a distendere piu′ uniformemente e piu′ simmetricamente la vagina. La procedura operativa e′ illustrata da figure.

SUMARIO

El autor discute la importancia del himen rigido y del perine el los matrimonios recientes y bajo el punto de vista de su picologia y de su tratamiento quirurgico. Con el dedo en el recto el cirujano puede hacer una incision liberal del perine sin peligro de cortal los esfincteres del ano. El tratamiento post-operatorio de dilatacion gradual y progresiva es una parte integral del tratamiento. El autor presenta un dilatador que favorece la dilatacion uniforme y simetrica. Una serie de ilustraciones se presentan para clarificar los puntos mencionados.

SOMMAIRE

Le traitement au commencement du mariage, de l’hymen et du péroné rigide, est discuté et l’auteur décrit le traitement de cet état avec ses rapports pscychiatriques et chirurgicaux. Il dit qu’en plaçant le doigt dans le rectum, on peut faire une incision généreuse du péroné sans blesser le sphincter rectal. Après l’opération, on aura recours à la dilatation progressive du rectum. Il présente un dilatateur qui obtient une dilatation uniforme et symétrique L'auteur présente des illustrations, démontrant les indications et les methodes qu'il emploie

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Rational Principles of Early Ambulation

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TEN years ago early ambulation was considered a "crack-pot" idea. Today, it is recognized and is rapidly approaching a "must" procedure following a surgical operation. Recognition rests on rapid recovery from the surgical ordeal. However, early ambulation has encountered the same difficulties that hindered acceptance of sterile technique over fifty years ago. Those who practice this procedure wholeheartedly and to the fullest extent now consider early ambulation indispensable to the well-being and safety of the surgical patient. From my experience and the experience of others, it has been found to save lives by hastening recovery, thereby preventing many fatal complications. It acts by rapidly restoring normal function of vital organs which have become crippled by surgical trauma.

Today, the procedure, as carried out in this country, varies considerably with different surgeons. Some surgeons get patients out of bed the day after operation; others on the second, third, fourth, and even the fifth postoperative day, and call it early ambulation. Then, there are surgeons who allow patients out of bed only when they have undergone the less serious surgical procedures; while with patients who have undergone the more serious procedures, they "wait and see" how the patients get along and, when "all is well," get them up but restrict their activity. Still others only permit their patients to sit in a chair when out of bed. These various ineffectual methods of management are responsible for the lack of uniformity of results as reported in the literature, particularly as to its value in postoperative phlebothrombosis and consequent pulmonary embolism.

When should patients be subjected to ambulation after operation, and what should be the procedure after the first out-of-bed period? What types of incisions and suture materials insure security of the wound in patients subjected to early ambulation? The answers to these questions are understandable only when considered from a physiologic and an anatomical viewpoint.[1]

We all appreciate the fact that the normal involuntary functions of the body are controlled and regulated chiefly by reflex action through the involuntary nervous system which consists of two divisions, the sympathetic and the parasympathetic. Generally speaking, these two divisions oppose each other; the one activates, and the other inhibits the functions of glands and involuntary muscles to meet shifting body requirements.

There are diseases that appear to be related to a long period of imbalance between the sympathetics and parasympathetics, such as peptic ulcer and essential hypertension. Vagus section is a recommended treatment for the former, and sympathectomy for the latter. A similar imbalance, though more severe, takes place after a major surgical operation. The surgical trauma initiates a complex series of nerve impulses of such magnitude and intensity that glands and involuntary muscles are activated or inhibited to an abnormal degree with consequent abnormal function. The abnormal function thus induced interferes with body secretions, the normal flow of body fluids, the required intake of oxygen, and the elimination of waste.

The functional disruption of otherwise normal organs as a result of the removal of a diseased structure is usually so pronounced that the patient is more ill during the immediate postoperative period and for several days thereafter than before the diseased organ was removed, even though the requisites for normal body function have *not* been altered. Thus, the initial illness after an operation is functional or neurogenic in character, in contradistinction to an organic illness. The more severe the functional illness after operation and the longer it is permitted to continue, the greater will be the danger of development of postoperative complications.

Prolonged abnormal function of this character in the presence of cytolytic toxins from trauma, which soon accompany the functional changes, is responsible for a vast majority of the most serious postoperative complications, particularly those related to respiration circulation and digestion

Now let us consider how trauma through reflex action produces abnormal function in these three systems and how normal activity may be rapidly restored by means of early ambulation

RESPIRATORY SYSTEM

Surgical trauma especially after an abdominal operation arouses nerve impulses of such magnitude that there is an overflow of these impulses into the inhibitory fibers of the phrenic nerve These inhibitory impulses diminish the tone and contraction of the diaphragm The diaphragm becomes relaxed occupying a high position in the chest and its excursion is limited while other respiratory muscles are usually in reflex spasm Thus the expansion and contraction of the thoracic cage is diminished, reducing tidal air and vital capacity The reduction of vital capacity is most pronounced after upper abdominal operations In some instances according to Churchill and McNeil,[2] the reduction may be as much as 80 percent and two weeks are usually required for the vital capacity to return to normal (Fig 1) Their patients were confined to bed

The limited excursion of the thoracic cage owing to this reflex inhibition is compensated by rapid shallow breathing, and according to Haldane Meakins and Priestly[3] rapid shallow breathing causes anoxemia Therefore, this reflex limits oxygen supply eventually causing adverse changes in the composition

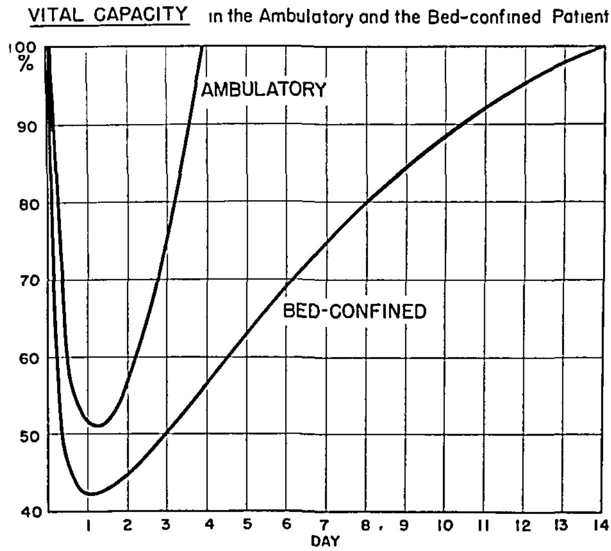

Fig 1 Effect of laparotomy on vital capacity in the bed confined and the ambulatory patient (Medical Physics—in the hands of the publisher[4])

of the blood itself. There is another adverse factor from inhibition of the diaphragm after operation. The limited excursion of the thoracic cage limits the contraction and expansion of the bronchioles; these movements are synchronized. The restricted expansion of the bronchioles in the presence of excess mucus from the activated bronchial glands is favorable to the development of bronchial obstruction; and, according to Hilding,[4] as the mucous plugs are removed by ciliary action, a negative pressure develops in the air cells (Fig. 2). If this process becomes extensive, it may cause collapse of an entire lobe. This seems to be the basic principle in the development of postoperative pulmonary atelectasis.

How can this reduction in chest expansion and contraction after operation be overcome, and how can the ill effects of excess mucus be eliminated during this critical period?

The reflex inhibition of chest expansion and contraction is most pronounced immediately after operation; it is then that the vital capacity is at its lowest ebb (Fig. 1). Therefore, an effort should be made at this time to overcome the abnormal function of the diaphragm —not one, two, three, or four days later when complications have already developed. How can this be done? By the upright position, coughing, and walking. The pull of gravity upon the abdominal contents lowers the diaphragm when in the upright position, and thereby increases vital capacity. Coughing expels mucous plugs, while walking stimulates deep breathing. Using this procedure, the vital capacity after an abdominal operation returns to normal in two to five days[1] (Fig. 1), instead of in fourteen days as usually required by bed-confined patients.

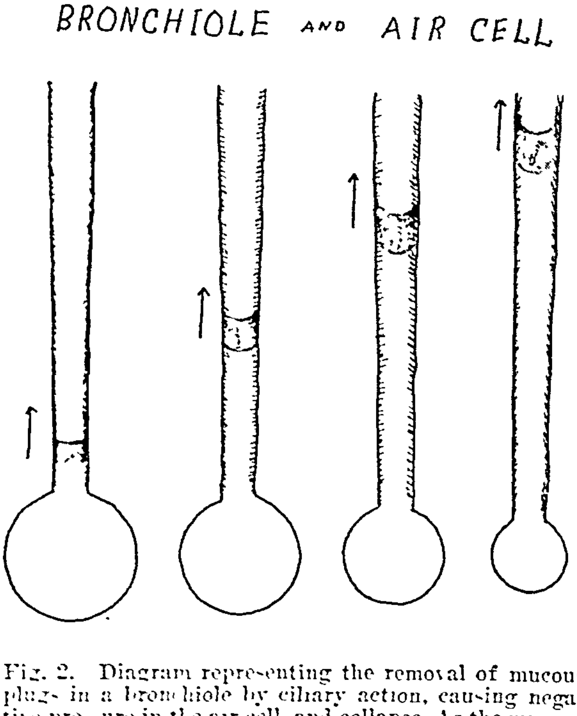

Fig. 2. Diagram representing the removal of mucous plugs in a bronchiole by ciliary action, causing negative pressure in the air cell, and collapse. As the mucous plugs converge to the larger bronchi, their removal may cause atelectasis of an entire lobe of the lung (as described by Hilding).

In 1930, Patey[6] commented: "Many efforts have been made by surgeons to overcome this inhibition of the diaphragm after an abdominal operation, but so far without any uniformity of success. Postoperative deep breathing exercises have little effect. . . . We must therefore conclude that at present the problem of efficient diaphragmatic movement in the presence of an abdominal wound remains unsolved." His patients were confined to bed.

Those of you who practice "early" ambulation have the solution to this problem, and appreciate that walking at regular intervals after operation is imperative for rapid recovery.

CIRCULATORY SYSTEM

Reflex action after surgical intervention also initiates abnormal function of the circulatory system. In the area of trauma there is vasodilatation, a reaction of inflammation, and remote from the area of trauma there is a compensatory reflex vasoconstriction. Fear and pain may also contribute to vasoconstriction. These changes tend to retard the flow and distribution of blood. Then, cytolytic toxins soon bring about changes in the blood itself: there is an increase in sedimentation rate, in leukocytes, and in fibrinogen.

Knisley, Bloch, Eliot and Warner,[7] by means of a specially constructed microscope, have observed that surgical trauma produces a sludge consisting of red and white cells in the blood stream (Fig. 3).

The red cells, which normally repel each other, become covered with a sticky protein substance that causes them to become agglutinated in masses These masses resist passage through the arterioles, and frequently cause complete obstruction in the flow of blood The endothelium of capillaries and small veins is then deprived of oxygen and becomes increasingly permeable, consequently plasma is lost excessively

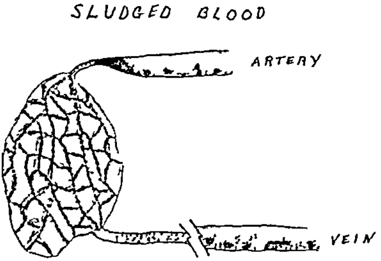

Fig 3 Diagram of sludged blood obstructing the arteriole, also sludge attached to the wall of the vein (as described by Knisley, Bloch, Eliot and Warner)

If this condition becomes widespread, shock may develop In addition, in the horizontal position or where the blood is flowing slightly uphill (as in the case of a patient in bed with the head elevated), the sludge has a tendency to settle to the bottom of the vessel and flows slowly as compared to the clear supernatant plasma The slowly moving sticky sludge may come to a standstill and 'become cemented together in long gelatinous masses' Should the sticky mass become attached to the vessel, it may form the nidus for the development of a large thrombus Thus the work of Knisley *and his coworkers provides a plausible* answer to the question of the etiology of post operative thrombo embolic disease in the bed confined patient

With this understanding of the changes in the blood after operation in the presence of vasoconstriction, the necessity for muscular activity, particularly walking, is immediately understood Walking opens the arterioles, and the volume of blood is markedly increased, this permits the sludge to pass, and materially hastens the return flow of blood in the veins Since thrombo embolic disease is usually associated with the deep veins of the legs, we have taken another precaution to avoid sludge becoming attached to these vessels during the in bed period This is done by means of an exercise chart which is placed in constant view of the patient (Fig 4)

The acceleration in the flow of blood as a result of these exercises and walking is a means of preventing the formation of a clot or of dislodging a small, loosely attached mass before a massive fatal clot can form Neither heparin nor dicumarol has been required or employed in my practice since the institution of early ambulation in 1938, in a series of over 2 500 abdominal and many other opera

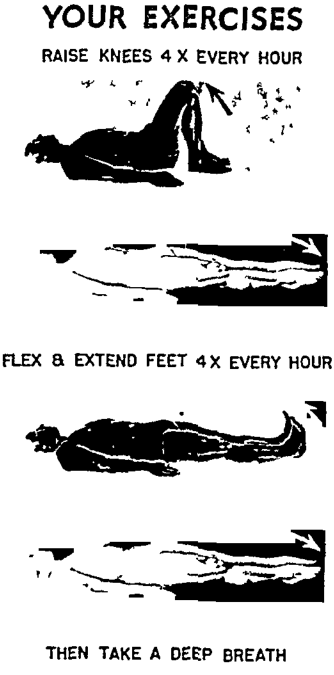
YOUR EXERCISES
RAISE KNEES 4 X EVERY HOUR
FLEX & EXTEND FEET 4 X EVERY HOUR
THEN TAKE A DEEP BREATH

Fig 4 Chart placed in patients' rooms to demonstrate in bed exercise (Leithauser[1])

tions. Not a single pulmonary embolism has occurred. nor has there been a recognizable phlebothrombosis in the deep veins of the legs. These results, in the presence of the reported high incidence of thrombotic disease, are sufficient evidence of the inestimable value of in-bed leg exercises and early ambulation in combating this most serious postoperative complication.

DIGESTIVE SYSTEM

Reflex intestinal inhibition after operation requires very little comment. Nerve impulses from trauma, fear, and pain are usually of such intensity that there is an overflow into the sympathetic nervous system which is inhibitory to the intestinal musculature. This overflow probably occurs to some degree after every abdominal operation. The extreme state of intestinal inhibition is recognized as adynamic ileus. Distention, when associated with nausea and vomiting, is indeed distressing; however, the more harmful effects probably come from pressure on the already crippled diaphragm and on the deep veins in the abdomen, which further embarrasses respiration and circulation. Exercise, especially walking, will also improve this reflex inhibition, promoting appetite and bowel evacuation by increasing the tone and motility of the intestinal tract. Ambulatory patients rarely require enemas.

INCISIONS

It has been a traditional concept that the security of abdominal incisions is incompatible with ambulation after operation. There is justification for this belief. The natural presumption is that the strain from ambulation would greatly increase the incidence of disruption and postoperative hernia. Reports in the literature reveal that approximately one celiotomy wound of every hundred disrupts. According to Sloan,[8] the longer the vertical incision. the weaker the incision line will become. and in ten years. 80 percent of incisions (vertical rectus) over five inches long show evidence of herniation or weakness.

However. paradoxical as it may seem. the recent literature on early ambulation reveals that the incidence of disruption and postoperative hernia is decreased in the ambulatory patient. This reduction, without question, is attributable to the fact that surgeons have acquired greater respect for muscle function, influencing their choice of the type of incision and suture material for patients whom they consider candidates for early ambulation.

In a consecutive series of over 2,500 celiotomies by the author, in which the patients were subjected to early ambulation after abdominal operation, there has not been a disruption, and only three incisional hernias have occurred. These results are attributed to the proper selection of incisions and suture materials (Fig. 5).

Abdominal incisions in these patients have been made in such a way as to retain the integrity of the fibers of the transversalis muscle. Only muscle-splitting, transverse, or midline incisions were employed. There is no strain on the sutured layers of the muscle-splitting incision. This incision was closed, in this series, with single 000 chromic catgut. In the transverse incision, there is no strain on the sutured layer of the transversalis muscle and its aponeurotic fibers. Contraction of these fibers actually compresses the incisional gap. This layer of the transverse incision was closed, in this series, with double 000 chromic catgut. However, in the transverse incision, the fibers of the external oblique muscle and its aponeurotic fibers are cut at right angles, therefore separate on contraction of this muscle. Interrupted sutures of alloy steel wire were used in this layer. In the midline incision, there is considerable pull on the suture line; however, the fascial layers are fused in the midline, and therefore hold sutures well. This layer was closed, in this series, with double loop sutures of alloy steel wire. The above incisions when closed in this manner need give no fear of disruption or postoperative hernia.

CONCLUSIONS

Early ambulation does not increase the danger of wound disruption or postoperative hernia provided the integrity of the fibers of the transversalis muscle are preserved, and proper suture materials are used.

The patient who is more ill derives a greater benefit from early ambulation than the patient who is less ill. The reason is obvious. Early ambulation promotes the normal function of

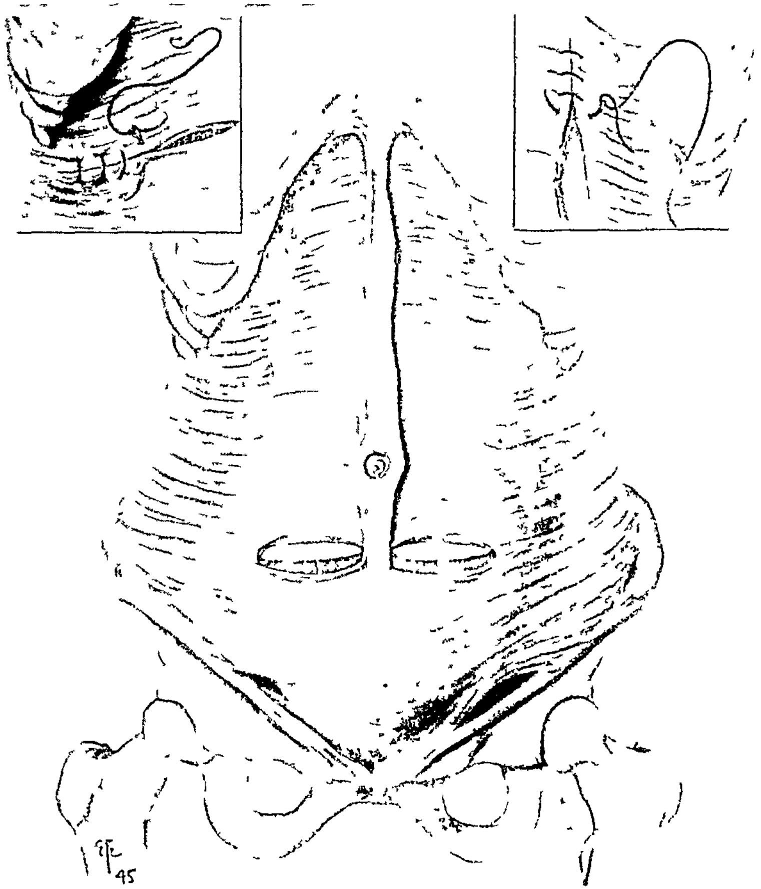

Fig 5 Transversalis muscle exposed by removal of all structures anterior to it Note the transverse direction of its fibers Inset, upper left, shows how firmly the sutures grasp the fibers in the transverse incision Inset upper right, shows contrasting difficulty of attempting to suture the cut ends of the fibers in the vertical rectus incision (Leithauser[1])

vital organs; lessens the severity of the illness after operation; improves the appetite; prevents postoperative atelectasis and pneumonia; prevents thrombosis and embolism; practically eliminates the need for the bed pan; shortens the period of convalescence by approximately one-half; and greatly reduces hospital expenses.

RIASSUNTO

Una precoce deambulazione non accresce il pericolo di una discissione delle ferite o di un'ernia postoperativa, purche' le suture siano state eseguite con materiale adatto e le fibre dei muscoli trasversali siano state rispettate. Da una precoce deambulazione beneficiano maggiormente i pazienti piu' gravemente malati e cio' per molteplici ragioni: perche' questa promuove una normale funzione negli organi vitali; diminuisce la gravita' della malattia dopo l'operazione; aumenta l'appetito; previene un' atelectasia ed una polmonite postoperatoria. nonche' trombosi ed embolismi; perche' elimina praticamente la necessita' della cosidetta padella; perche' abbrevia di circa meta' il periodo di convalescenza e riduce quindi corrispondentemente le spess di ospedalizzazione.

SUMARIO

La ambulacion temprana no aumenta el peligro de dehiscencia de la herida ni favorece la hernia post-operatoria siempre y cuando se hayan preservado la integridad de las fibras del musculo transverso abdominal y se haya usado un material de sutura apropiado. La ambulacion temprana favorece mas al paciente que esta mas enfermo. por cuanto estimula el funcionamiento normal de los organos vitales. incrementa el apetito y previene la atelectasia post-operatoria y pulmonia; previene la trombosis y el embolismo: elimina casi practicamente el uso del basinete: acorta el periodo de la convalescencia en la mitad; y, finalmente, reduce considerablemente los gastos hospitalarios.

SOMMAIRE

L'ambulation précoce n'augmente pas le danger de disruption de la plaie ou d'une hernie postopérative, pourvu que l'integrité des fibres du muscle transversé soit préservé et qu'on ait employé un matériel de suture approprié. L'opéré qui est plus malade, présente un plus grand bénéfice de l'ambulation précoce, que le malade qui est moins malade. L'ambulation précoce favorise la fonction des organes vitaux, diminue la sévérité des malaises postopératoires, augmente l'appétit empêche l'atélectase et la pneumonie postopératoires, empêche le thrombose et l'embolisme, élimine l'emploi du bassin, abrège la période de convalescence et diminue pour le malade les dépenses de son séjour à l'hopital.

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Plastic Repair of the Female Breast
Physical and Psychic Indications Plus Author's Technic

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PLASTIC surgery in general, and that of the breast in particular, have been subjected to severe criticism largely because the term has been used by quacks, charlatans and some unscrupulous surgeons to apply to the practices which disgrace the surgical art So called plastic surgery of the face as well as of the breast has been offered to the credulous and foolish with the promise of changing ugliness to beauty Not infrequently the victims have been left deformed and more repugnant than they have been Nevertheless true plastic surgery is a legitimate surgical art Its object is the removal or masking of a repugnant disability or deformity [1,2]

The function of the female breast in reproduction readily explains its appeal to the human imagination The breast idealized by artists is a thoroughly normal one—a hemispheric body with the nipple projecting from its center, resting on the wall of the chest on either side of the sternum and extending from the level of the second to the sixth rib and from the sternum to the axillary border The outline of the base is elliptic, 10 or 12 cm across and about 1 cm less in height, projecting about 5 5 cm

In young women who have not been pregnant, the amount of glandular tissue is small in comparison with the fat between the lobules The gland is supported by enveloping skin and the superficial fascia of the thorax, which invests it and gives off septa (Cooper's suspensory ligament) It also penetrates the gland and helps toward its support A layer of fat separates the gland from the underlying pectoralis major muscles

In hypertrophy due to pregnancy, obesity or congenital tendency, the weight of the breast strains the suspensory tissues Marked discomfort as well as unsightliness result from stretching of the skin and ptosis

Knowledge of the vascular supply of the breast is important to successful surgical treatment The lateral portion of the gland is supplied by the long thoracic artery, a branch of the axillary Since that portion of the gland deriving its arterial and venous network from this source is in our methods always separated from its basis and sometimes resected the vessel supplying the central portion of the gland and the nipple must be preserved, principally the second third and fourth perforating branches of the internal mammary artery

Of the three main constitutional types of deformity of the breast, *true hypertrophy,* with a marked increase in glandular tissue without a corresponding oversupply of fat is rare This type appears immediately after the onset of menstruation and is completely developed in a few months The breasts may reach enormous proportions, with unbearable weight impeding normal activity

Hypertrophy with fatty degeneration is common In this type, fatty, not glandular, tissue is excessive Sometimes the breasts extend to the navel This deformity is as common in young girls as in older women, and often it is in striking contrast to the shapeliness of the rest of the form It inflicts profound psychic as well as physical discomfort The dragging sensation at the shoulders and chest is not relieved by change of position Faulty posture results, detracting further from the woman's appearance Circulatory disturbance in the engorged part may cause eczema, with itching to add to the patient's distress

Atrophy may involve the gland or the subcutaneous fat or both Usually it is a stigma of aging, but it is growing more common in young women, owing to the mania for slimness

INDICATIONS FOR RECONSTRUCTIVE SURGERY

The plastic reconstructive operation with elevation of the re formed organ is indicated by symptoms the patient complains of and the experience of the surgeon [9] Both physical and mental complaints must be considered

Pain (mastodynia) and circulatory disturb ances are the important physical symptoms. Often the latter affects the heart, with increasing discomfort, disability, debility, tumor formation and sometimes gangrene. Activities are restricted. Kyphosis, scolosis, abdominal relaxation and pulmonary and psychogastric disturbances may result. Sometimes patients restrict their diet in the hope of correcting the condition, and nutritional deficiency follows. Hormonal disturbances have been observed to result from hypertrophy of the breasts, and correction may be followed by improvement in ovarian function. The liability to cancer, sarcoma and Paget's disease is reduced by surgical correction.[3]

Mental complaints make the case even stronger. Women with heavy, sagging breasts are keenly aware of the handicap to their appearance. Many social activities are closed to them, and they are under a vocational disability, not only because good appearance is vital to the woman in business, but because active movement is prevented. Walking, dancing and sports are impossible. Excessive perspiration restricts a woman's social acceptance. Many women avoid social contacts and become depressed and morose, and sometimes suicidal tendencies develop.

CONTRAINDICATIONS

Pulmonary, cardiac, renal and metabolic disease are the principal contraindications to mammoplasty. Eczema, suppurative processes and scarred skin from burns must be treated preoperatively. The patient should not be operated on three days before to three days after the menstrual period. It is inadvisable to perform this operation on extremely nervous, unbalanced persons. Moreover, the experienced surgeon should not refuse to perform the operation without good reason, for by so doing he may leave the patient to the unscrupulous and the inexperienced, with unpleasant and sometimes disastrous results.[11]

TECHNIC

The proper technic must aim to achieve the following general points:

1. The operation must be free from danger.
2. It must not leave behind unsightly scars.
3. The function and blood supply of the gland structure must be respected.
4. There must be a certain grade of permanency regarding the result.

Besides these general precautions regarding the result of mammoplasty, our technic was developed to achieve:

1. Shapely breasts of firm consistency and virginal appearance.
2. Nipples with their areolas of circular design protruding at the highest point of the breasts.
3. Symmetric divergence of the axes of the breasts.

Besides those features just stated the skin itself for the new breast must be firm. This is achieved only by using the skin above the level of the nipple in the reconstruction of the breast. The lateral prominence of the hemispheric breast must be harmonious as it is in nature, i.e. without formation of the skin pouches at this part.

The scars must be confined to the circumareolar area and the submammary fold. All vertical scars are esthetically contraindicated and practically always conspicuous. The nipple must be entirely visible in profile, and from the front view must be placed symmetrically with the other nipple, both in relation to the sternal line and in height. Any convergent strabismus of the nipples must be avoided.

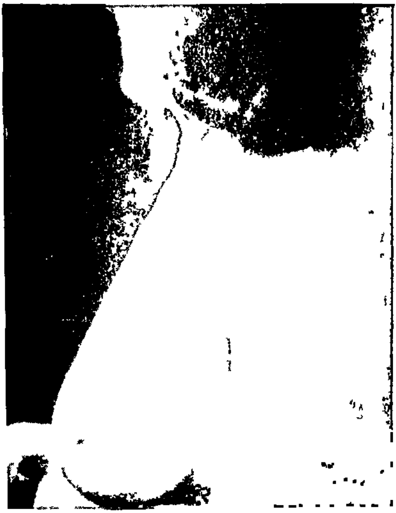
HIGHLIGHTS OF OUR TECHNIC

With the circumareolar skin evenly stretched by the assistant's hands, the mammilla and the areola are circumcised with a 1.5 cm. of de-epithelized cutis left all around.

A slightly sinusoid incision above the circumcised areola and an incision laid parallel to the submammary fold about 1 cm. above, the two meeting laterally in the outer axillary line, medially about 2 cm. from the lateral sternal line leaving a crescent-shaped area of skin between them to be excised.

The skin including a fairly thick pad of subcutaneous fat above the entire upper part of the gland is undermined until one reaches the proximal margins of the gland where it is only loosely attached to the pectoral fascia. Thus the greatest part of the breast is denuded.

Nearly three fourths of the denuded gland are now—mostly bluntly—separated from the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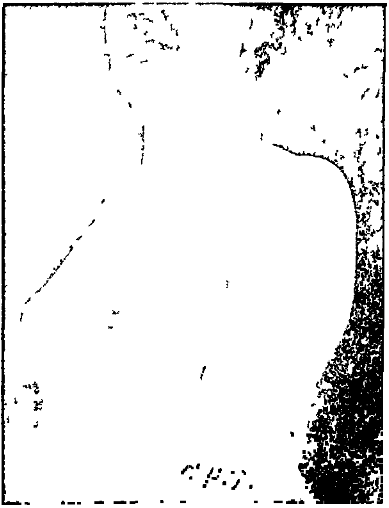
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pectoral muscle respectively the fascia The gland is elevated in its two lateral quadrants, shutting off the blood flow from the long thoracic artery *It is separated also in* the proximal part of the upper inner quadrant and slightly in the lower inner quadrant, where the small perforating arteries and veins are divided

The remaining gland flap is supplied entirely by the three branches of the internal mammary artery, which are enclosed in the pedicle of the flap

In the hypertrophic breast, nearly the whole upper half of the gland fat flap is resected with an amputation knife, which is carried from the surface vertically through the whole thickness of the gland down to the pectoral muscle Depending on the size of the gland, the part lateral to the nipple and part of the lower portion also may be resected The reduced, properly trimmed fat gland flap then is molded into a snail like, conic shape by clockwise rotation of its peripheral free end which includes the nipple The spirals are *loosely but carefully joined with catgut* stitches, without strangulating the fat tissue to avoid necrosis of it The whole cone is *fastened to the pectoral muscle with a few* penetrating stitches in the lateral and upper portions

After fenestration of the skin flap, which is going to envelop the resected breasts contents, and buttonholing of the nipple and its areola into the opening, the skin flap is attached to the cone with catgut stitches from inside with great care being taken not to perforate the skin surface This procedure eliminates empty spaces between skin flap and cone and avoids accumulation of blood and lymph between them Later on the ugliness of pouches in the lateral part of the new breast is by this technical feature obviated After this has been accomplished the superfluous parts of the skin flap in the lateral regions are removed to avoid the unsightly bulges seen so often after mammoplasty With fine silk, the buttonhole wound margin is sutured to the transposed nipple and areola With heavier silk or cotton, the horizontal submammary incision margin is fastened to the lower margin of the skin flap. A drain is inserted into the lateral corner of the lower suture line of each breast, and left for 24 hours.

The technic for atrophic, saclike deformity of the breast is approximately the same, except that little or no fatty and glandular tissue is removed.

After three months, aftercorrection can be done, usually with the patient under local anesthesia. Shrinkage of fatty tissue, the blood supply of which was partially interfered with at the first operation will be complete at this time, and the amount of excess skin above the diminished fat can be seen distinctly. The redundancy is corrected together with other incongruities which could not have been avoided at the earlier operation. The horizontal scars are excised, and the wound margins reunited in new suture lines corresponding exactly with the submammary folds.

SUMMARY

The described method has been developed to minimize risk completely, preserve the function and blood supply of the gland structure, and achieve shapely, firm breasts diverging symmetrically and without unsightly scars. It is applicable in approximately 90 percent of all breast hypertrophies of both dystrophic and adiposohypertrophic types. The gross initial operation is performed in one stage under light general anesthesia. The aftercorrections, leading to the final shapeliness, can be performed under local anesthesia. The main feature of our technic is the formation of a fat gland flap with mesial pedicle of an adequate blood supply to the nipple and the areola. Technic was developed during the years 1935 to 1937 and was first described at the Second European Congress of Structive Surgery at the Royal College of Surgeons, London, 1937. Its basic features have been adopted by Gillies and McIndoe in their method published in 1939.

RIASSUNTO

Il metodo descritto dall′A. e′ rivolto a ridurre ad un minimo il rischio operatorio. a conservare la vascolarizzazione e la funzione della ghiandola. ad ottenere delle mammelle ben conformate e divergenti simmetricamente, senza cicatrici deformanti. Puo′ essere adottato nel 90 percento dei casi di ipertrofia mammaria, sia del tipo distrofico, sia del tipo adiposo—ipertrofico. L′operazi one principale viene eseguita in un solo tempo, sotto lieve anestesia generale: le correzioni successive, atte a perfezionare il risultato estetico definitivo, vengono invece compiute in anestesia locale.

La principale caratteristica del metodo consiste nella formazione di un lembo adiposo—ghiandolare, con un peduncolo prossimale atto a supplire una sufficiente quantita′ di sangue al capezzolo ed all′areola.

La tecnica operatoria, sviluppata nel 1935-1937, e′ stata descritta per la prima volta nel 1937 al secondo Congresso Europeo di Chirurgia plastica presso il Regio Collegio di Chirurgia di Londra. Le caratteristiche principali dell′operazione sono state adottate nel metodo pubblicato da Gillies e McIndoe nel 1939.

SUMARIO

Se ha desarroyado un metodo operatorio de la glandula mammaria que preserva su circulacion y por lo tanto su funcion, y que al mismo tiempo asegura una forma firme y estetica de la glandula, sin cicatrices muy visibles. Esta operacion es aplicable al 90% de los casos de hipertrofia de la glandula, tanto en los tipos distroficos como en los adiposohipertroficos. La operacion primaria inicial se practica en una etapa, bajo la anestesia general; las operaciones sucesivas se practican bajo la anestesia local. La caracteristicas principales de esta tecnica es la formacion de una flapa cuyo pediculo tenga una circulacion abundante. Esta tecnica se desarroyo en los anos 1935-1937 y fue presentada ante el segundo Congreso de Cirujia Estructiva del Colegio Real de Cirujanos de Londres en el ano 1937. Las caracteristicas basicas de esta operacion han sido adaptadas al metodo del Gillies y McIndos y que fue publicado por estos autores en el ano 1939.

SOMMAIRE

La méthode que l'auteur décrit a été développée afin de diminuer complètement le risque opératoire, de conserver la fonction et

la vascularisation de la glande mammaire et d'obtenir des seins fermes, gracieux avec separation symétrique et ne laissant aucune cicatrice disgracieuse L'operation est applicable dans approximativement 90 percentum de toutes les hypertrophies mammaires dystrophiques et adiposohypertrophiques L'operation initiale principale se fait sous anesthesie generale légere Les corrections consecutives ayant pour but l'embellissement, se font sous anesthesie locale Le trait principal de la technique est la formation d un lambeau de la glande et du tissu adipeux ayant un pedecule fournissant une suffisance de sang au mamelon et à l'aréole La technique fut developpee durant les annees 1935 a 1937 et fut decrite la premiere fois au Second Congres Europeen de Chirurgie Plastique tenu au College Royal de Chirurgiens a Londres en 1937 Ses bases fondamentales furent étudiees par Gillies et McIndoe et publiees en 1939

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Case Report

Ventral Hernia as a Complication of Pregnancy

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VENTRAL hernia during or antecedent to the pregnant state is sometimes encountered, and there are cases of hernia in which the uterus lies outside the abdomen in a hernial sac.[6] The greater number of modern textbooks are silent on the subject of ventral hernia as a complicating factor in maternity. This is surprising since the surgery of obstetrics has made great progress in late years. For many reasons it is important to determine what influence pregnancy has on this disease as a whole, whether it causes it, aggravates it, or is complicated by it.

In March, 1889, Samuel Adams[1] of Washington, D. C., reviewed the literature and found that eight cases of "Hysterocele Ventralis" had been reported and he proceeded to give a summary of each. The cases were treated in methods which varied from permitting the patient to go into labor normally, to delivery by cesarean section. Sylvester Saxtroph,[7] a Dutch practitioner in the early part of the nineteenth century, was one of the first to observe a hernia complicating pregnancy in a peasant woman who had had four normal labors. In her fifth pregnancy, the gravid uterus escaped through the abdominal wall and hung down below the knees. The case was seen by several of the most noted physicians in Holland, but none ventured to interfere. She went on to term and into labor.

Saxtroph reports that the uterine contractions forced the fetus into the abdominal cavity and through the birth canal. The reported results seem to indicate that conservative treatment was most advisable at that time since abdominal surgery was attended by far greater complications than we find today.

Levy[9] of the Touro Infirmary, New Orleans, reported a case of pregnancy associated with a marked diastasis of the recti muscles in a woman pregnant for the 13th time. One month before term, the gravid uterus has escape into the hernial sac. At term, guarded attempts were made to return the uterus to th abdomen and to force the presenting part int the pelvis. This was unsuccessful. He the performed a Porro-cesarean section with repair of the hernia. His patient made a relatively uneventful recovery, but he failed t state the indications for the removal of th uterus.

Rongy[8] in 1922 reported a case of a woma who had a marked median ventral herni through which protruded a gravid uterus covered only by the skin and subcutaneou fat of the abdominal wall. This woman ha had four previous cesarean sections. He performed the fifth cesarean section and then repaired the hernia. Boys[2] reported a case whic he considered a strangulated hernia containing a pregnant uterus. He performed a classical cesarean section and delivered a 1 pound, 14 ounce female infant. Neither th uterus nor the adnexae were found to b gangrenous and apparently were not strangulated. In an exhaustive review of the literature, he found that only eight cases of hysterocele with strangulation have been reported.

CASE REPORT

Mrs. L. B., a 35 year old multipara, was admitted to the hospital, Jan. 7, 1947 complaining of severe back pain, low abdomi[illegible] in and occasional nausea and vomiting. T[illegible] as in he ninth month of gestation and [illegible] history [illegible] obtained:

[illegible] childhood, the patie[illegible] age [illegible], age eight; and [illegible] e age of 20 she had [illegible] rted at the age [illegible] s apart, lasting [illegible] slight dysmenc[illegible]

[illegible] regnancy was [illegible] tion. Durin[illegible] nancy she gained over 30 pounds and during the last trimester she complained of prepubic, sacral, and ankle edema She also had three episodes of hyperemesis gravidarum Her B P at term was 100/70, pulse 72, RBC 2,900 000, hemoglobin 60 percent, and WBC 12,000 The patient went into labor 29 days after the date of expectancy After 16 hours of labor, a roentgenogram revealed the fetus lying in the transverse position with the right shoulder presenting A low flap cesarean section was performed and a normal living female infant was delivered weighing 10 pounds 12 ounces Her postoperative course was uneventful

In May, 1946 the patient conceived again and suffered from intermittent episodes of abdominal and low back pain with constipation which lasted throughout her pregnancy Her weight which was usually 160 pounds was 205 pounds upon admission to the hospital Her blood pressure during two prenatal visits was 120/80 and 116/80, hemoglobin was 76 percent, RBC 4 000,000, and her urine showed a trace of albumin on both visits She stated that during the first few months of pregnancy she had worn a corset, but had discarded it when she discovered that it increased her nausea and vomiting and her abdominal pressure and shortness of breath In the month prior to admission she had noticed a red, excoriated area on the most dependent portion of the abdomen

Physical examination revealed an obese white female, age 34 lying comfortably in bed, and complaining of abdominal pain Her head and eyes

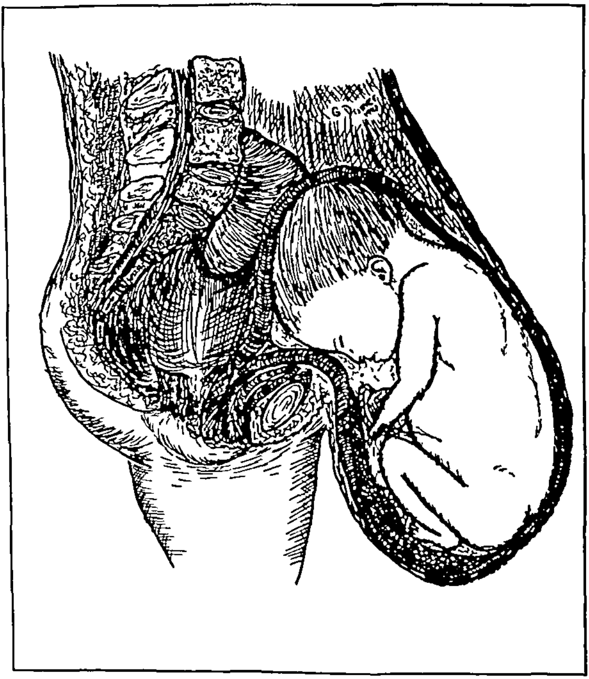

Fig 1 Sagittal section reconstructing pelvic relationships with fetus lying within the uterus in the hernial sac

were normal, and the ears, nose, and throat were negative. Examination of the neck revealed the trachea in the midline, thyroid not enlarged, and no palpable lymph glands; chest—no masses in the breasts, lungs clear and resonant; heart—sounds of good quality, no murmurs audible, blood pressure 120/80, pulse 82 and regular; abdomen—obese, pendulous, hanging between the thighs.

There was an irregular, elliptical area of excoriation approximately three inches long and one inch wide at the most dependent portion of the abdominal wall. A midline suprapubic scar from the previous cesarean section was found to be stretched in all directions. There seemed to be little or no tissue between the skin and the underlying uterus. A right pararectus appendectomy scar was also found to be stretched and distorted. The fetal parts were easily palpable through the paperthin tissue covering the uterus. The fetal head was found above the pelvic brim with occiput to the left, the small parts to the right and the breech in the most dependent portion of the uterus (Fig. 1). Extremities—reflexes normal, two plus pitting edema of both ankles.

Roentgenographic examination revealed a full term fetus lying completely outside the pelvis (Fig. 2). There was no cephalopelvic disproportion.

Laboratory Data: Blood count—RBC, 3,850,000, hemoglobin 76 percent (Sahli), WBC 7,700, polys 78 percent, lymphs 12 percent, monos 7 percent; eosins 3 percent. Blood chemistry—sugar 89 mgs. percent, urea nitrogen 16.4 mgs. percent, creatinine 1.2 mgs. percent. Urinalysis—(voided specimen) specific gravity 1.020, albumin two plus, sugar, acetone, diacetic acid and bile absent. WBC 6-8 per h.p.f., RBC 25-30 per h.p.f., few epithelial cells, no casts. Blood Type—Type A, Rh positive, Wassermann negative.

Hospital Course: Two days following admission, the patient complained of intermittent abdominal pains every 5-8 minutes which resembled labor pains. It was thought that labor might aid in bringing the fetal head into the pelvic brim, but repeated attempts in the two hours after the onset of labor pains accompanied by moderately strong contractions were of no avail. The patient was premedicated with phenobarbital, grains 2, and sent to the operating room.

A fractional spinal procaine anesthetic was started. A midline incision was made below the umbilicus and continued through the fascia and peritoneum. A transverse incision was made in the visceral peritoneum about two inches above the uterovesicle reflection. The uterus was then opened transversely in its lower segment, membranes were ruptured and a normal nine pound, eight ounce male was extracted which cried spontaneously and was found to be in good condition. The placenta was removed and the uterine musculature was sutured with interrupted chromic No. 1 catgut and reenforced with a continuous chromic No. 1 suture. The lower peritoneal flap was sutured to the uterus above the uterine incision, to achieve peritonealization.

In repairing the abdominal wall, it was first necessary to trim away approximately four inches of skin on either side of the midline incision in addition to the firmly adherent underlying fascia and peritoneum. All bleeding points were carefully stopped. The peritoneum and transversalis fascia could now be easily identified, and were brought together with a continuous No. 0 plain catgut suture. The recti muscles were approximated with interrupted No. 0 plain catgut sutures. The external rectus sheaths were then imbricated by using interrupted chromic No. 1 mattress sutures to attach the right flap to the under surface of the left flap and a continuous No. 1 chromic suture was used to complete the overlapping procedure. The skin was approximated with interrupted nylon Stuart stitches.

Postoperatively, the patient's temperature rose to 102° F. and dropped to normal on the second postoperative day, remaining below 100° F. until the patient's discharge on the ninth postoperative day. Sutures were removed six days postoperatively with the wound healed by primary union.

The patient has been followed approximately one year and was last seen on Jan. 10, 1948. The abdominal wall was in good condition and there was no evidence of recurrence of the hernia.

DISCUSSION

In discussing this topic, Cartaya[3] observed that there are two causes which dispose a pregnant female to hernia. One is the relaxed, softened state of the muscle fibers with an excess of fluid in the tissues, and the other is the weight of the gravid uterus and the intestines.

Normal process of labor presupposes normal anatomical relations within the pelvic cavity and the abdomen. When these relations are in any way disturbed, the mechanical interference with the expulsion of the child is inevitable and this is precisely the situation which arises when ventral hernia, which is a mechanical defect, is exhibited in a pregnant woman. The force of the uterine contractions is either diminished or not exerted in the proper direction. The result is that labor is delayed and frequently cannot be terminated until outside interference is brought into play

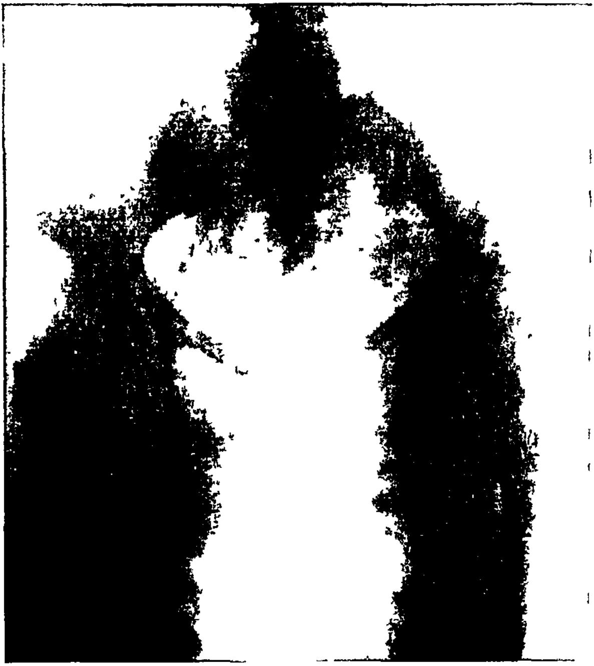

Fig 2 Preoperative roentgenogram showing fetus superimposed on pelvis with breech in the dependent fundus of the uterus (Compare with Fig 1)

Women who exhibit a marked separation of the recti muscles either in the form of a simple diastasis which may have been a result of poorly managed previous pregnancies, or in the form of a true incisional hernia are likely, especially if they are at all obese, to suffer from an aggravation of the defect during pregnancy [9] It is, indeed quite possible for the pregnant uterus, especially in the later months of gestation, to escape through the weakened abdominal wall and to sag below the symphysis [4, 10] If reposition is possible in such cases it is seldom permanent No type of mechanical support is likely to be effective [5] If the uterus can be returned to the abdominal cavity just before term, and if a presenting part can be forced into the pelvis so that the effect of the uterine contractions can be directed into the proper channels, vaginal delivery may be possible as was demonstrated by Saxtroph

A review of the literature fails to reveal whether or not herniation of the pregnant uterus occurs more frequently in patients who have had previous cesarean sections or other lower abdominal operations. We feel, nevertheless, that meticulous repair of low abdominal incisions would tend to reduce the incidence of this condition in subsequent pregnancies. The cesarean section in the abovementioned case undoubtedly contributed to the formation of this hernia with her second pregnancy.

Since the literature reveals that obese women are more prone to develop this condition, the attending physician should do his utmost in attempting to prevent excessive weight gain in all obstetrical patients.

The pathology of this state may be due to the tearing of the recti muscles from their attachment or separation of the muscles from each other below the umbilicus, thus producing a diastasis.[3] Thereafter, there follows central bulging of the abdominal wall into which the pregnant uterus tends to gravitate. In this way, the entire anatomical relationship is changed, and the uterus assumes a dependent position. There is stretching of the round, broad, and sacrouterine ligaments which cause severe pain. The abdominal skin and fascia are greatly stretched, a condition which interferes with their normal circulation and nutrition. This results in an excoriation of the most dependent portion of the skin over the hernia and may complicate healing of the abdominal wound after repair if this area is not completely removed with the scar from the previous operation.

In retrospect, it is difficult to determine whether or not the wearing of a tight abdominal binder or corset during the first six months of pregnancy would prevent this condition from arising. It is not likely that, had the uterus been prevented from falling forward by sufficient abdominal support, herniation would have resulted. Had this been done, this patient might have been permitted to go into labor with a tight abdominal binder and deliver spontaneously from below. Since it was impossible to reposit the uterus so that the forces of uterine contractions would be directed downward through the birth canal, it was feared that the natural forces of labor would result in rupture of the uterus. Cesarean section, with reposition of the uterus and repair of the ventral hernia, was therefore chosen as the solution to this problem.

SUMMARY

A case of herniation of the gravid uterus through the abdominal wall after a previous cesarean section is presented. In this case it was felt that conservative management would have been the treatment of choice, had it been possible to reestablish relatively normal anatomical relationships. It is also felt that proper abdominal support throughout pregnancy might have prevented this condition. Since it was impossible to correct the malposition of the uterus and fetus sufficiently to permit normal labor and delivery fom below, low-flap cesarean section was performed with reposition of the contracted uterus and repair of the ventral hernia.

RIASSUNTO

Descrive un caso di ernia dell′utero gravido attraverso la cicatrice di un precedente taglio cesario. Un opportuno sostegno addominale durante la gravidanza avrebbe probabilmente prevenuto quest′incidente, mentre un intervento operativo avrebbe potuto essere evitato qualora fosse stato possibile ristabilire dei rapporti anatomici relativamente normali. L′impossibilita′ di correggere la malposizione dell′utero e del feto in modo da permettere un parto normale per la via vaginale ha costretto invece l′A. ad eseguire un taglio cesareo sul segmento inferiore, seguito da una ricostruzione plastica delle pareti addominali.

SUMARIO

El autor presenta un caso de hernia del utero gravido por la pared abdominal resultante de una operacion cesareana previa. En este caso quizas hubiera sido posible un tratamiento conservativo con el uso de un soporte abdominal apropiado durante todo el curso del embarazo que hubiera evitado la hernia. Sin embargo la existencia de la hernia y la imposibilidad de corregir la mal-position del utero y del feto lo suficiente para permitir un parto normal, requirio el tratamiento quirurjico de operacion cesareana baja con reposition del utero contraido y reparacion de la hernia ventral.

SOMMAIRE

Un cas de hernie de l'utérus gravide à

travers la paroi abdominale, consécutif à une section césarienne est présenté Dans ce cas le traitement conservatif aurait été de choix, s'il avait été possible de rétablir les rapports anatomiques normaux, nous sommes aussi de l'opinion que si un support abdominal avait été employé durant la grossesse, cette condition ne serait pas survenue Comme il était impossible de corriger la mal position de l'utérus et du fétus suffisamment pour permettre un accouchement normal et une delivrance par en bas nous fimes une incision cesarienne suivie de reposition de l uterus et de reparation de la hernie ventrale

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INFORMAL DINNER FOR MEMBERS OF THE

INTERNATIONAL COLLEGE OF SURGEONS,

THEIR WIVES AND GUESTS

during the meeting of the American Medical Association

Atlantic City, Thursday, June 9, 1949, Strand Hotel

Reception 5 P.M. promptly Dinner 6 P.M. promptly

Adjournment 9 p m promptly to afford ample time for those desiring to attend the reception for the *President* of the American Medical Association

Editorial

Doctors of Infamy: An Editorial Book Review

A COMPLETE and fully documented account of the medical and surgical crimes perpetrated by German physicians and surgeons under the Nazi political regime during World War II is now available in "Doctors of Infamy," a book newly released from the presses of Henry Schuman, New York. The authors are Dr. Alexander Mitscherlich, head of the German Medical Commission to U. S. Military Tribunal No. 1, Nüremberg, and Fred Mielke.

Professor Andrew C. Ivy, M.D., vice-president of the University of Illinois and medical scientific consultant to the Prosecution at the same tribunal, contributes a telling introduction based on his personal investigation of the facts. Brigadier General Telford Taylor of the U. S. Army, chief of counsel for War Crimes, adds a judicial and condemnatory statement clearly setting forth the legitimate limits of experimental work in the medical field and the utter disregard of principle with which these limits were violated. Dr. Leo Alexander, psychiatrist and consultant to the secretary of war and to the chief of counsel for War Crimes, discusses the attempts of the Nazi scientists, in collaboration with Reich political authorities, to cover the ruthless destruction of racial groups and handicapped persons under the mask of scientific research. A note on medical ethics in general is contributed by Albert Deutsch, who includes in his presentation the new Hippocratic Oath as adopted by the World Medical Association. The main body of the book has been translated from the German by Heinz Horden.

This material, gathered by men of indisputable authority in their fields and supplied with incontrovertible evidence from Nazi letters and directives, many of which are quoted in full, lends new force to the proclamation of the World Medical Association condemning not only the men who took active part in the incredible slaughter but the doctors who gave it their tacit support by silence. Briefly, this proclamation covers the following points:

1. Solemn condemnation of the crimes committed against humanity by German medical practitioners and endorsement of the judicial punishment of the criminals.
2. Invitation to representative German medical organizations to make public admission of guilt, pledging themselves to future respect of human personality, dignity and freedom.
3. Re-emphasis on the need of eternal vigilance on the part of all doctors and full recognition of the influence of medicine on society in general.
4. Re-emphasis on the need of maintaining throughout the medical curriculum the traditional aims and ethics of medical practice.
5. Recommendation that a uniform oath or promise based on the spirit and content of the Hippocratic Oath should be subscribed to by every medical practitioner on receiving his medical degree and his license to practice.

The Journal of the International College of Surgeons wholeheartedly subscribes to all these propositions and also to revision and extension of the Hippocratic Oath to include formal recognition of the rights of all human beings, regardless of color, race or creed. The *Journal* also recommends to physicians and surgeons a careful study of the actual facts as set forth in this book which bears witness to the foulest hypocrisy, as well as the cruelest butcheries, ever recorded of man.

"Doctors of Infamy" is not a large book, as books go. It contains not quite two hundred pages in all. But the civilized reader, turning these pages over, cannot escape the feeling that his fingers dabble in blood. Here are the facts, attested to and proved. In the clean name of science, thousands of helpless and inoffensive men, women and children were violated, maimed, blinded, beaten, starved, frozen, tortured to death with thirst, decapitated, and buried or burned alive, not by an infuriated mob but by cool minded scientists and accredited healers who directed the whole debauch with a stop watch in one hand and a notebook in the other Day after day these doctors murdered their quota, night after night, quite undisturbed in mind they returned well satisfied to the Gemutlichkeit of family life or professional comradeship In all the bloody history of the world there has been no such record till now

We have fondly believed that man's barbarous days were ended We have seen him marching slowly but steadily upward, discarding one by one his bestial vices his uncontrolled animal appetites and ferocities We have seen him learning to follow the light of the mind Now in a moment in the twinkling of an eye, we are compelled to see that torch blown out and to witness the naked anguish of a continent darkened and writhing in primitive fear The maxim, Forgive them, for they know not what they do, has no application here The German doctors knew very well what they did They had spent their lives and energies learning to do it They did not scruple to add to the violence of *murder and* mutilation the subtler treason of deliberate infection of prisoners with deadly disease More, they delighted in it and spoke of it proudly

For the sake of a collection of the skulls of Jews—"a repulsive but typical species of subhumanity '—these human jackals *processed* in a single experiment one hundred and fifteen human beings of both sexes *Processing* consisted of murdering these persons with lethal gas, detaching their heads from their bodies, packing the severed heads in airtight containers and shipping them to headquarters to be denuded of flesh, classified and ticketed like exhibits in a museum In an experiment on animal heat, men were stripped naked, chilled to unconsciousness and placed between the bodies of naked women, and the time it took to restore them was carefully noted This engaging experiment was reported almost genially by the observers Other freezing experiments, sometimes with simultaneous starvation, were conducted on a massive scale The victims begged to be shot, but the doctors were obdurate

Vacuum and pressure chamber experiments were made to determine resistance to high altitudes A typical experiment 'on a Jew aged 37 in good condition," resulted in death at the end of half an hour Electrocardiographic tracings were taken every five minutes and recorded the victim's agony and death Rascher who was in charge, reported proudly 'This is the first case of its kind to be observed in man The experiments are being continued and expanded "

In experiments on making sea water potable by chemical treatment, prisoners were tortured by thirst and starvation to a state of insanity, many of them lapped like dogs at the filthy water used to scrub floors Those who became delirious were tied to their beds Symptoms of heart trouble were coldly observed and duly recorded

The inoculation experiments were gruesome almost beyond comprehension One large group of victims underwent infection with typhus for the sole purpose of keeping a supply of typhus infected blood available Dr Kogon commented, with a trace of irritation, that nearly all of them died But this lack of cooperation, *though annoying*, was not disastrous, there were plenty of other victims ready to hand Plenty of Jews and human beings of other religious beliefs of both sexes, plenty of helpless prisoners to be given typhus, tetanus, cellulitis and infectious jaundice and to scream out their pitiful lives without mercy or help, in order that the great new therapy of the Master Race might come to its speedy fruition

Gas also, being a potent weapon of war and an excellent agent for the extermination of "undesirables," was given exhaustive and appalling tests The agonies of prisoners treated with mustard gas are described in such a manner as to be nearly unreadable "After about ten hours burns began to appear all over the body Some of the men went blind The pains were so terrific that it was almost impossible to stay near these patients " Nevertheless, be it noted, all the burns of all the patients were photographed every day In those who died, autopsy revealed the liver and inner organs completely eaten away

Experimental surgery enjoyed a prolonged field day, with unlimited material at hand for fractures, bone grafts, amputation and wound infection. The operating table became an instrument of mutilation and murder. Legs of victims were broken with a hammer in several places and left after a day or two without casts, to heal as best they might. Various pathogenic bacilli, notably those of tetanus, were introduced into the wounds; so also were fragments of wood and slivers of glass. Nerve sections were removed and the results recorded. Bone slivers and segments were liberally intertransplanted. Patients mutilated beyond repair were quickly disposed of by lethal injection. Injection, in fact, of any one of several swiftly lethal agents (notably benzene) was a favorite device; it was relatively inexpensive, and it cleared out the wards with admirable speed, so that other victims might not be keep waiting too long.

The tissue of lies and hypocrisy on which this wholesale slaughter was based is obvious throughout, since not one of these bloodcurdling experiments resulted in the slightest gain to medical science. But from the standpoint of intellectual corruption the infamy reached its zenith in the race-destroying programs of murder and sterilization. The ghastly mass killings and mutilations in these categories were based overwhelmingly on "unfitness" due to nothing more than the misfortune of belonging to an unfavored racial or religious group. Euthanasia, by the way, acquired a new definition in the process, for it would be difficult to describe these deaths as easy. Extermination of the Jews and others of political beliefs different from the Nazi doctrine was the central purpose, and even the fanatics who desired it most could not deceive themselves into believing that there was any scientific purpose behind the massacre. The murder of aged and enfeebled persons and of young children with congenital mental or physical defects had long been a part of Hitlerian economy. Peculiar Nazi logic.

In the course of the murderous program, wards full of children were simply left to starve. Men and women in droves were disposed of by gassing. Elaborate medical histories and records were kept, but in the case of any Nazi-rejected person the flimsiest conceivable excuse was enough to warrant the death sentence.

The destruction program, said one of the doctors concerned, was a purely routine job. "Of this new instalment (Jews) I managed to do seventeen today; Müller fifteen," he reported. At 5 P.M. sharp we 'downed tools' and went to dinner." It is not to be doubted that after such labors they enjoyed their meal.

Sterilization was performed ruthlessly upon thousands of men and women, either by roentgen ray treatment or by surgical means. Most of the victims were driven back to slave labor immediately afterward, in spite of their excruciating pain. Some of them, unable to walk, fell down; these were dragged back and gassed.

The results of all sterilizing procedures were checked with painstaking care. SS Lieutenant Brandt was particularly anxious. In a written directive he suggested that, in case of doubt, it would be well to "lock up a Jewess with a Jew for a certain period of time, any success attained to be reported."

The total callousness with which these doctors regarded the suffering of their victims is glaringly evident. Their casual manner of referring to the matter suggests that they were speaking of vermin, not human beings. "I did not trouble about what would be done with the bodies of the inmates I had poisoned," said one, and another answered in response to a question in court, "I paid no attention to the nationality of the murdered inmates." With unexampled hypocrisy the Nazi authorities sent unctuous "regrets" to the bereaved families following them up a few days later with a container purported to hold the ashes of the loved one but actually filled with ashes shoveled up at random from the crematory floor. It is difficult and also time-consuming to select the ashes of any particular corpse from a heap containing the ashes of several others.

Twenty-three of these criminal physicians —by no means the total number—were brought to trial. Only a few of the lower-ranking ones showed any uneasiness of conscience. The arch-fiends were as bland and complacent as ever. "I served my Fatherland," said Brandt, "as others before me."

One is forced to admit a tragic truth in his words. The Fatherland has been served by many like him, not only in the recent war but in that which preceded it. The appalling feature of the situation in World War II is that these men were doctors, and that they had the tacit connivance of the whole German medical profession behind them. Not one effective voice was lifted in protest The fact that not all German doctors took an active part does not and cannot exempt them from guilty responsibility, as the World Medical Association has pointed out

Physicians all over the world, shocked beyond expression by these monstrous and innumerable desecrations of the medical ideal, have found themselves at a loss to express their horror. If after so many centuries of struggle, persecution and martyrdom the medical profession itself, which has had to fight every step of the way for recognition and achievement, can fall so swiftly and easily to such barbarous depths, it is hard to reaffirm one's belief in man's power to escape the vestigial beast within him. Could it happen here, this infamy? Are these among us, here in American towns, doctors who are capable of this treason to their fellowmen? Would political pressure strip them of culture, wisdom and decency and turn them in a moment from men to murderers? Could one foul breath of tyranny blow out the light?

These are grave questions indeed, but they must be faced. The state of the world today is more than alarming Only by the strictest adherence to the original ideals of our profession can we hope to retain the confidence of those we serve Only by pledging ourselves anew to the art of healing, without discrimination, all those who come within the sphere of our ministrations, can we keep our self respect as men and doctors In these complicated times there are already many barriers—some necessary, some unavoidable—between physician and patient The traditional intimate relation is hard to maintain. But when that tradition goes, disaster will follow; and the possible magnitude of that disaster can be seen in the pages of this book as in a mirror. The difference between a decent physician and these Nazi animals is altogether a difference of mind and spirit, and it behooves us to examine in ourselves the condition of both, not once but repeatedly. Moral disintegration, like cancer, is sometimes asymptomatic at first.

Needless to say, the young men and women now coming into the practice of medicine and surgery must be safeguarded from the beginning To this end the World Medical Association recommends the administration of the new Hippocratic Oath to every candidate for a professional degree

> "Now being admitted to the practice of medicine, I solemnly pledge to consecrate my life to the service of humanity. I will give respect and gratitude to my deserving teachers I will practice medicine with conscience and dignity. The health and life of my patient will be my first consideration I will hold in confidence all that my patient confides in me.
>
> "I will maintain the honor and the noble traditions of the medical profession. My colleagues will be as my brothers. I will not permit consideration of race, religion, nationality, party politics or social standing to intervene between my duty and my patient. I will maintain the utmost respect for human life from the time of its conception Even under threat I will not use my knowledge contrary to the laws of humanity.
>
> "These promises I make freely upon my honor."

This is much in line with the admonitions on the diploma for Fellowship of the International College of Surgeons, designed and worded by Dr. André Crotti:

> "Be aware that the life and health of your patients depend upon your knowledge and your conscience.
>
> "Never allow material and personal gain to become the guides of your conduct.
>
> "Remember that your duty is to seek constantly your professional perfection.
>
> "Also, never forget your obligations to your colleagues."

Thus the World Medical Association and the International College of Surgeons have much in common.

The need for the revision of the Hippocratic Oath is in itself a sad commentary on present-day civilization, for all the promises it contains were implied in the original Oath of Hippocrates and should have required no emendations. Nevertheless it is well that the additions have been made, for no precaution can be too great to take in the prevention of another major medical debacle. The young physician or surgeon just entering practice will take this oath at a time when, it is to be hoped, he is still ardently imbued with the practical idealism of the genuine physician, and before corruption has had an opportunity to attack him. The more specific the promises he makes, the greater the probability that he will keep them. As the British Medical Association has pointed out, neither the science nor the practice of medicine can be separated from the external moral values.

The profession has always had a profound effect upon the state of society in general. How can it be otherwise? Society is the doctor's field of work. In the human relations with which he must deal daily—relations with his patients, his colleagues, his aides and the world in general, he wields an influence, both by precept and example, that can only be described as tremendous. As a physician or surgeon he is dedicated entirely to the best interests of his patients; as a teacher, to the soundest possible guidance of younger men; as a scientist, to the most devoted study and research, followed by the generous sharing of his discoveries with colleagues who may find them useful; and as a human being to the moral and spiritual verities he has learned from his preceptors, his experience, and his acquaintance with the great minds of the past.

These responsibilities are essential to the health of the medical profession. Without them, nothing significant can be accomplished; and the absence of any part of any one of them will inevitably create a vacuum, to be filled sooner or later with some form of corruption. *The Journal of the International College of Surgeons* urges everyone connected in any way with medicine or surgery to support the program of the World Medical Association and recommends that every man who has had or expects to have the life of a human being in his hands to read every word of "Doctors of Infamy," that he may know the full measure of his task and the high responsibilities it entails.

MAX THOREK

workers were quick to recognize the implication of the findings of Aschheim and Zondek and Professor Butenandt was supplied with large quantities of extract of the urine of pregnant mares for the isolation of the oestrus-producing hormone. Interesting and important papers began to come from his laboratory. His brilliant degradation work demonstrated clearly the constitution of oestrone. Later he made fundamental contributions on the constitution and partial synthesis of progesterone and the isolation and characterization of androsterone.

Professor Butenandt on several occasions before the war lectured in English in the University of London.

Anti-TB Drive in India

The first nation-wide BCG vaccination campaign in India was officially inaugurated at Madanapalle, near Madras. The campaign was launched for the purpose of trying to lower the rate of tuberculosis among children and adolescents, and is to be carried out jointly by the Indian health authorities and the World Health Organizations. It was these authorities which last May sent a medical team of tuberculosis experts to India at the government's request. Since transportation of BCG vaccine from Europe was unreliable, WHO also sent India a pharmacologist to assist in starting the laboratory. The laboratory now produces the vaccine.

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Dr. Walter C. Alvarez, Mayo Clinic, *Science,* 109:122, believes that Goebbels comment in "Goebbels' diaries" should give poise in times of peace to political machinery in its effort of baiting scientists and great men. Goebbels tells of an occasion on which he, Frick, and Rust were guests of the Fuehrer. He wrote, "Their comments and remarks were so idiotic as to reveal how completely out of the picture they really are. They delivered themselves of stupid phrases. . . ." The important point is that Rust was the Nazi Minister of Education and had been an inmate of an insane asylum. He was the one chosen to persecute the scientists and university leaders causing them to flee from Germany for their lives. In his devotion to his Fuehrer, Goebbels tried to make him out as a would-be patron of science, ignoring the fact that he had appointed a miserable quack as his private physician.

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Putting men of science in their places is great fun for politicians but Goebbels has told us how disastrously this policy pays off when war comes.

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One rather ominous feature in connection with malaria control measures instituted in Italy was that after a D.D.T. house-spraying campaign in a coastal region north of Naples and in the Tiber delta, it was found that house flies were not affected. Apparently a race of flies abnormally resistant to D.D.T. has become predominant in those areas and also in other regions of the mainland where the insecticide has been in use for several years. While the general sanitary value of the spraying is lessened, thus far all varieties of anopheline mosquitoes remain susceptible to D.D.T. and malaria transmission rates continue very low.

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New Books

Cancer of the Esophagus and Gastric Cardia. Edited by George T Pack, and contributors St Louis, The C V Mosby Co, 1949

This book comprises the subject matter which originally appeared in *Surgery*, June, 1940 The articles deal with carcinoma of the cardiac region of the stomach and carcinoma of the esophagus The esophageal carcinomata are dealt with in separate sections which concern the cervical, middle and lower portions of the esophagus

In the discussion of cancer of the cervical esophagus, a series of 77 cases is reported in which 11 (14 percent) were operable In seven of the operable cases (64 percent) the tumor was resectable Of the seven patients in whom the cervical esophagus was resected, one patient died on the second postoperative day of cardiopulmonary complications, the other six patients survived the operation and had a rather uncomplicated course Four of these latter patients were alive seven years, one year, nine months, and six months after surgery, none of these showed recurrences Two were alive with recurrences three years, and three months after resection

Rotation roentgen therapy as practiced by the Scandinavian school of radiologists is discussed The statistics of Dr Jens Nielsen suggest that this type of therapy might have a place in the treatment *per se*, as well as palliation of carcinoma of the esophagus

Many sections are devoted to the various anastomoses, both supra and infra aortic

This book will be useful for all those interested in the subject of esophageal carcinoma, and can be recommended to those who desire information concerning the modern management of these previously inoperable lesions

Surgical Pathology. By P A Herbut, M D Pp 710 Philadelphia, Lea & Febiger, 1948 $12 00

The publication of this work marks the arrival of a newcomer into the literature devoted to surgical pathology The book has been designated primarily to aid candidates for the higher degrees in surgery, and also surgical pathologists who desire a brief review of their subject After a perusal of the text, we thoroughly agree that the author has admirably succeeded in his purpose

The material has been discussed on a purely regional basis, or to be more specific, the classification of the subject matter is systemic—a plan frequently adopted in most works on surgical pathology Each chapter is preceded by a brief account which highlights the essential features of the normal histology, anatomy, and embryology of the topic under discussion

The illustrations are adequate, although the clarity in reproduction of some of the microphotographs are not as successful as one would desire There are no colored plates

The pathology of the nervous system is omitted, as are discussions on such general considerations as inflammation repair, tumors, infection, hemorrhage, thrombosis and embolism But those systems which are covered are presented in an up to date, comprehensive manner This book will undoubtedly enjoy a wide market

Osler as a Gastroenterologist By Felix Cunha, M D San Francisco, Times Star Press, 1948

The figure of William Osler, whose life, work, teachings and personality have inspired thousands, has seldom been depicted with such appreciation than in the pages of this volume Dr Cunha's treatment presents him at full stature, with admiration for his skill, wisdom and energy and with due reverence for his outstanding personal qualities

The frontispiece, a singularly appealing portrait of Osler, corroborates Dr Cunha's enthusiasm The face shows evidence of his humanity as well as his shrewdness and power It is a face that inspires instant confidence, and as we proceed through the ensuing pages with their wealth of quotation, anecdote, allusion and reminiscence, we are impressed anew with the extraordinary breadth of the Oslerian outlook on life and learning

An inveterate reader, Osler persistently urged his students to read He himself, in his early youth, was deeply and permanently influenced by Sir Thomas Browne's *Religio Medici* Dr Cunha expresses the opinion that this book was the foundation of his later philosophy Obviously he never forgot it or ceased to reread it, for he owned a first edition which was laid on his coffin at death A book collector's item not kept under glass but thumbed and worn from its owner's constant use

His other reading was both wide and varied, not confined to medical literature On the contrary he protested early and vigorously against medical chauvinism, the attitude of mind that leads a doctor to despise and disregard "anything outside his own school or circle"

This habit of far ranging study, together with a natural disposition toward humanity contributed notably to the lasting value of all Osler's writing workers were quick to recognize the implication of the findings of Aschheim and Zondek and Professor Butenandt was supplied with large quantities of extract of the urine of pregnant mares for the isolation of the oestrus-producing hormone. Interesting and important papers began to come from his laboratory. His brilliant degradation work demonstrated clearly the constitution of oestrone. Later he made fundamental contributions on the constitution and partial synthesis of progesterone and the isolation and characterization of androsterone.

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Rotation roentgen therapy as practiced by the Scandinavian school of radiologists is discussed The statistics of Dr Jens Nielsen suggest that this type of therapy might have a place in the treatment *per se* as well as palliation of carcinoma of the esophagus

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This book will be useful for all those interested in the subject of esophageal carcinoma and can be recommended to those who desire information concerning the modern management of these previously inoperable lesions

Surgical Pathology By P A Herbut, M D Pp 710 Philadelphia Lea & Febiger 1948 $12 00

The publication of this work marks the arrival of a newcomer into the literature devoted to surgical pathology The book has been designated primarily to aid candidates for the higher degrees in surgery and also surgical pathologists who desire a brief review of their subject After a perusal of the text we thoroughly agree that the author has admirably succeeded in his purpose

The material has been discussed on a purely regional basis or to be more specific the classification of the subject matter is systemic—a plan frequently adopted in most works on surgical pathology Each chapter is preceded by a brief account which highlights the essential features of the normal histology, anatomy and embryology of the topic under discussion

The illustrations are adequate although the clarity in reproduction of some of the microphotographs are not as successful as one would desire There are no colored plates

The pathology of the nervous system is omitted as are discussions on such general considerations as inflammation repair, tumors infection hemorrhage thrombosis and embolism But those systems which are covered are presented in an up to date comprehensive manner This book will undoubtedly enjoy a wide market

Osler as a Gastroenterologist By Felix Cunha M D San Francisco Times Star Press 1948

The figure of William Osler whose life work teachings and personality have inspired thousands has seldom been depicted with such appreciation than in the pages of this volume Dr Cunha's treatment presents him at full stature with admiration for his skill wisdom and energy and with due reverence for his outstanding personal qualities

The frontispiece a singularly appealing portrait of Osler corroborates Dr Cunha's enthusiasm The face shows evidence of his humanity as well as his shrewdness and power It is a face that inspires instant confidence and as we proceed through the ensuing pages with their wealth of quotation anecdote allusion and reminiscence we are impressed anew with the extraordinary breadth of the Oslerian outlook on life and learning

An inveterate reader Osler persistently urged his students to read He himself in his early youth was deeply and permanently influenced by Sir Thomas Browne's *Religio Medici* Dr Cunha expresses the opinion that this book was the foundation of his later philosophy Obviously he never forgot it or ceased to reread it for he owned a first edition which was laid on his coffin at death A book collector's item not kept under glass but thumbed and worn from its owner's constant use

His other reading was both wide and varied not confined to medical literature On the contrary he protested early and vigorously against medical chauvinism in the attitude of mind that leads a doctor to despise and disregard anything outside his own school or circle'

This habit of far ranging study together with a natural disposition toward humanity contributed notably to the lasting value of all Osler's writing and especially to the world-wide popularity of his famous *Practice of Medicine*, which has been read with delight by laymen as well as by physicians. "No other book of science," comments Dr. Cunha, "ever so quickly gained its popularity and maintained it." The book is enlivened throughout with well chosen and pointed literary allusions, which, in combination with Osler's own witty and lucid style, makes excellent reading.

Gastroenterology was a subject of immense interest to Osler. His first contribution to this branch of science was made unwittingly when, as a student in Toronto, he was assigned a postmorten study of a huge sacculated aortic aneurysm. Young Osler's attention was caught by the extrinsic pressure on the esophagus. Later he was to write countless papers on gastroenterologic problems: ulcers of the stomach, pylorus and duodenum; hepatic cirrhosis, especially the ascitic phase; tumors of the gastrointestinal tract; gallstones; peritonitis; pyloric stenosis, and an almost limitless succession of other conditions.

"Hardly any aspect of pathology," says Dr. Cunha, "escaped his scrutiny and attention." He did exhaustive studies on trichinosis, and published important descriptions of diagnostic exploratory technics in detecting cancer of the stomach long before roentgen ray diagnosis was available. Even after Roentgen's discovery he stoutly maintained that in certain cases a positive diagnosis could be made only after an exploratory laparotomy.

Osler was a prolific writer and had prodigious energy throughout his working life. "There was never to be any lying abed till noon for Osler. . . . The foundation upon which his life was built was work. If one were to measure his activity by the number of published papers, then the years 1895, 1896 and 1897 were the most prolific. However, during his entire active writing career he managed to get together an average of 30 papers a year, plus five pathological reports, five educational addresses and about the same number of book reviews. . . . One can only say that he must literally have lived, eaten and slept with medicine, for he did not employ a ghost writer."

Generations of readers will be thankful that he did not. His own pungent style adds enormously to his writing. Some of his aphorisms are unforgettable. "If you see anything that you know is true, begin to doubt it at once. The mental kidney, more often than the abdominal, is the one that floats. The value of experience is not in seeing much but in seeing wisely." These are the comments of a man aware of all human fallibility, who did not hesitate to ascribe that fallibility to physicians and who never forgot its existence in himself.

His humanitarian attitude is summed up in a little masterpiece of advice: "dealing as we do with poor suffering humanity, we see the man unmasked, exposed to all the frailties and weaknesses. . . . Keep a looking glass in your own heart . . . the more carefully you scan your own frailties the more tender you are for those of your fellow creatures."

This book is a refreshment to the spirit as well as to the mind. The steadfast practical idealism, the optimism uncluttered by fatuity or self-deception that were so characteristic of Osler are needed today. The great medical minds of the past, whether recent or remote, have much to offer physicians of today. Not least among the giants is William Osler, whose mind and motives are represented here.

The Lung. By William Snow Miller, M.D. Ed. 2. Pp. 222. Springfield, Ill., Charles C Thomas, 1948. $7.50

This is essentially a treatise on the gross and microscopic anatomy of the lung, and represents over 50 years research by a single worker, although credit is given to many other workers.

Early in 1887 Dr. Miller became interested in the anatomy and pathology of the air spaces in the lungs, inspired by Dr. Francis Delafield and J. West Roosevelt. Further studies followed in Leipzig and Johns Hopkins. Data accumulated and it was not until 1937 that the first edition of this work was published. A second printing was made in 1940, followed by a third in 1943. These were reprintings, not new editions. This second edition has been published simultaneously by the Ryerson Press, Toronto, Canada.

The surgeon will find nothing here regarding diseases of the lungs; therefore no technics for removal of a lobe, for thoracoplasty or for other procedures. Nevertheless, it is well for one to review the anatomy of blood vessels and lymphatics in order to understand pulmonary pathology. Lymphatics form a closed system and do not connect with connective tissue spaces, nor with the pleural cavity by means of stomata. No lymphatics are present in the walls of the air spaces distal to the ductuli alveolares, but the larger bronchi possess two sets of lymphatics. One may thus have a better understanding of metastases.

There are 255 references in the bibliography. The index might have been improved by separating subject and author instead of running them together. This is in the interest of quick and easy reference.

Only an investigator who has a tremendous capacity for detail can write down his observations as Dr. Miller has done. He seems not to have missed a single point in the mastery of his subject.

Textbook of Anaesthetics By R J Minnitt and John Gillies Ed 7 Pp 568 Baltimore, The Williams and Wilkins Co, 1948

This well known British work has of late been receiving increasing attention among American students of anesthesia and it is to be expected that this edition will receive widespread dissemination on this side of the water For this book has progressed considerably since its infancy when it was known as a *Handbook of Anaesthetics* This excellent textbook is the product of a wide range of subject matter and a comprehensive treatment applied to the material by the authors

The bulk of the book deals with general anesthesia but there are adequate accounts on conduction and intravenous anesthesia In addition there are new chapters on the uses of curare and the therapeutic applications of oxygen helium carbon dioxide and nitrogen A final chapter is devoted to medicolegal aspects which should be read by all medical men who earn their livelihood in the operating pavilion

This book is recommended as one of the better short works on anesthesia

Lives of Master Surgeons By Richard A Leonardo MD Pp 469 New York 1948 Froben Press Inc $6 00

This book was designed as a companion piece of an earlier work, *History of Surgery* written by the author in 1943 Essentially, it consists of thumb nail biographies of surgeons—some famous some obscure—past and present Only deceased men are included The arrangement of names is in alphabetical order This work should prove useful as a quick source of reference for historians and other interested readers

Atomic Energy Karl K Darrow PhD New York John Wiley & Sons Inc $2 00

These four lectures were designed for people who understand the language of physics but whose special fields lie elsewhere The object was to develop and stress the salient features pertaining to the transformation of energy of rest mass into energy of motion and energy of heat—a concept which is meant by "atomic energy"

Some of the concepts are not easy to believe Precise assertions are made about the ultramicroscopic astronomical like structure of these tiny bodies that they circle and spin, that they make collisions with each other which simulate the characteristics of a traffic accident that they defy ones motion of the solidity of solid matter and the deadness of dead weight"

Atomic structure is explained in terms of the protons neutrons and electrons which comprise the nucleus of the atom Darrow differentiates between an ordinary chemical reaction and a physical change in the structure of the nucleus itself Thence he leads the reader to more complex subjects what isotopes are how the scientist can bombard the nucleus and force it to transmute itself into the nucleus of another element what radioactivity is and finally how man has developed and unloosed the self perpetuating chain reaction

Simple analogies help the reader grasp the basic principles of nuclear theory and the atom s characteristics of weight mass and energy Numerous illustrations make the discussion doubly clear

What has already been done in this field is one of the monumental achievements of all time There is promise of much more On the side lines physician and surgeon eagerly and anxiously await the application of this knowledge to the cure of neoplastic and other forms of disease

The Clinical Management of Varicose Veins By D W Barrow MD Pp 155 New York Paul B Hoeber Inc 1948 $5 00

There are few surgical conditions which have received as much ill merited lack of consideration as the disease entity known as varicose veins Hurriedly glossed over in the surgical curriculae of most medical schools dallied with by the general practitioner, and frequently neglected by the busy surgeon varicose veins have not always received the precise active treatment which they call for It is therefore most fitting that this monograph on the subject appear for herein the author has ably covered the entire gamut of the disease with its frequent complications

The order of presentation of the subject material is logical starting with the anatomy and physiopathologic aspects then proceeding onto the symptomatology, the diagnostic tests most frequently used with their interpretations, and finally the suitable therapy The text is comprehensive but succinct

The diagrams are clear, and the entire work will be readily understood and appreciated by anyone seeking thorough information about the distressing condition of varicosities of the lower extremity

Abstracts from Current Literature

Atypical Crohn's Disease. Bennett-Jones, M. J. and Wigglesworth, G. F., *Brit. J. of Surg.,* July 1948, 36:65

In 1932 Crohn, Ginsberg and Oppenheimer first described 14 cases of regional ileitis, recognizing it as a pathological entity. In America, by 1937 over 200 cases had been recorded in most of which Crohn's original description was found to apply. The disease is usually maximal in the terminal ileum, but we now recognize that the cecum and ascending colon may also be involved. The inflammatory phase is occasionally encountered by surgeons because of signs and symptoms suggesting appendicitis. Many of these cases have remained symptom free for a year. The obstructive phase of the disease is less common and sometimes associated with internal or external fistulae.

Taylor (1945) stated that Crohn's disease could not be distinguished from hypertrophic ileocecal tuberculosis by means of clinical features or morbid anatomy. He presented three cases, two of which died from miliary tuberculosis. Tubercle bacilli were found in resected specimens which simulated Crohn's disease.

The authors present three cases in which tuberculosis is definitely ruled out by culture and stained sections.

The first case is atypical owing to the size of the mesenteric glandular enlargement. There was central necrosis, rupture, and peritonitis. The second case was unique. There was repeated swelling of the right buttocks with sciatica, fever, limitation of motion suggesting tuberculosis of the hip. Abdominal symptoms were minimized. A rectal examination disclosed a pelvic abscess which was opened by the examining finger. Operation disclosed an inflammatory mass in the pelvis involving the terminal ileum, cecum and appendix. Because of the patients poor condition an anastomosis was made around the mass. At a later operation 2 feet of terminal ileum and the right colon were removed and a fistula into the rectum was closed. Seven months later this man was well and strong and working.

The third case is unusual in that only the cecum was affected. The right half of the colon was resected with only enough of the terminal ileum being removed to permit anastomosis. She is well after eight and a half years.

VICTOR T. HUDSON

Etiology of Acute Pancreatitis. Lium, R., and Maddock, S., *Surgery,* 1948, 24:593-604.

The various theories concerning the etiology of acute pancreatitis are reviewed and discussed. From the literature, the authors conclude that the concept of etiology of acute pancreatitis (as enunciated by Wangensteen *et al,* and Rich and Duff) considers acute pancreatities, due to obstruction to the pancreatic ducts associated with an actively secreting gland, the most tenable one. The authors studied this problem experimentally by ligating the pancreatic ducts of cats and then stimulating the pancreas to secrete. The methods used to stimulate the pancreas to secrete were: feeding, stimulation of the vagus, injections of acetylcholine, pilocarpine and secretin. 64 cats were used in various experiments.

As a result of these experimental studies the authors stated that acute pancreatitis was the result of pancreatic ductal obstruction associated with an actively secreting gland. The degree of pancreatitis would depend then upon whether the obstruction to the pancreatic ducts was temporary or total, and whether or not the gland was actively secreting. The most extensive degree of acute pancreatitis was found with complete occlusion of the pancreatic ducts associated with an actively secreting gland.

M. O. CANTOR

The Treatment of Angina Pectoris by the Surgical Production of Adhesive Pericarditis, Thompson, Samuel Alcott, *Am. Practitioner,* 1948, 3:81.

Relief of anginal pain following surgical production of adhesive pericarditis is due to two factors: (1) Establishment of an extracardiac collateral circulation from the adherent pericardium; (2) and production of myocardial hyperemia which leads to the development of a collateral circulation in the heart muscle.

Experimentally it has been shown that ligation of the left coronary artery in dogs produces an immediate mortality of 50 percent, but if the dogs are previously protected by instillation of talc powder in the pericardial sac, the mortality rate following ligation of the same artery is zero. It should be pointed out that the production of adhesive pericarditis is apparently not related to a constrictive pericarditis and is not reproduced by this experiment.

The treatment of angina pectoris depends on increasing the cardiac reserve. Any increase in the cardiac reserve beyond that which the patient has at rest, will diminish the severity of anginal attacks. The author describes an operation in which the left fifth costal cartilege is removed leaving the perichondrium behind The internal mammary vessels are preserved The pericardial sac is opened and 10 cc of a two percent solution of novocaine is instilled into the sac This is allowed to remain for five minutes and is then aspirated Two drams by volume of sterile U S P talc powder are now distributed widely over the visceral pericardial surface Caking of powder is avoided The wound edges are protected from the powder Aside from a pneumonitis and clinical mediastinitis indicated by a temperature of 102 to 103 degrees, all symptoms subside and the patient is well in five to seven days

Selection of the patient depends on a definite diagnosis of coronary disease with angina lack of improvement after prolonged medical treatment and an extreme degree of disability Contraindications are congestive heart failure and an active myocardial infarct

The mortality rate from the operation was 16 percent of 36 patients reported Eighty five per cent of the patients were more than 50 percent improved and 70 percent of the patients showed marked improvement

M T FRIEDELL

Isotopes in Neoplastic Disease Lawrence, John H, *Rky Mts Med Jr* 1948, 45 980

Isotopes have three applications in the problem of neoplastic disease 1 the carcinogenic properties of irradiation apply to the irradiation emitted by isotopes as well as to that of x rays or radium, 2 isotopes can be used as tracers in trying to learn more about the nature of the cancer cell, and 3 they can be used therapeutically as a source of destructive irradiation In isotope therapy there is the problem of giving irradiation to the tumor cell without causing harmful irradiation to normal cells The examples in which success has been achieved are enumerated

The use of radioactive phosphate which localizes in bone marrow has been successful in the treatment of leukemia The use of radioactive phosphate P32 has been noteworthy in management of polycythemia vera The application of radioactive iodine has been helpful in management of hyperthyroidism The use of filter paper saturated with sodium radiophosphate placed over warts, basal cell carcinoma and keratoses has given favorable results The use of radioactive colloidal compounds which localize in the marrow, spleen, and liver have been useful as therapeutic agents in polycythemia vera and chronic myelogenous leukemia

The author feels that the great contribution of radioactive isotopes is not so much as therapeutic agents as will be their use as tracers to study metabolic processes

GEORGE J BAER

Surgery of Portal Hypertension Learmonth, J R, and MacPherson, A I S *Lancet,* 1948, 2 882

This paper records the author s experience with surgical procedures to relieve 16 patients with symptoms of portal hypertension by means of venous shunts or when portal obstruction was limited to the splenic vein, by splenectomy alone

The patients were classified as follows

	No of cases
Group I lienorenal venous anastomosis	9
Group II splenectomy (lienorenal venous anastomosis judged impossible)	3
Group III laparotomy only	1
Group IV splenectomy for splenic thrombosis	3

In *group 1,* all had some degree of hepatic cirrhosis Haematemesis was the only symptom in three of the cases, ascites was present at beginning of illness in three cases, but absent or minimal when haematemesis occurred, and in the remaining three both ascites and haematemesis were present Two patients died after operation, one was a recent operation and not included in the series and the remaining six were reviewed after postoperative periods ranging from four to twenty three months In none of the six had haematemesis recurred after operation The authors were impressed by the improvement in the general condition of these patients—all had gained weight and returned to full employment

In *group 2,* a lienorenal anastomosis had to be abandoned usually because the renal vein was not suitable There was no appreciable improvement in these cases One died 26 days after operation They do not recommend splenectomy in such cases but consider it wiser to abandon the operation

In *group 3* laparotomy was only a palliative measure for ascites

The anastomosis was performed by means of a 'Vitallium' tube They have had no experience with end to side anastomosis The chronic type of cirrhosis rather than the acute type offers the most promising results from this operation

In *group 4,* the obstruction to the portal circulation was in the splenic vein and the presenting symptom was haematemesis, the haemorrhage being from dilated collaterals about the cardia which connect with the vasa brevia to the systemic circulation The liver was normal in these cases, and splenectomy alone gave immediate uniformly good results

D J LEITHAUSER

Cancer of the Rectum. Rankin, Fred W., *Rky. Mt. M. J.*, 1948, 45:1023.

Cancer of the rectum is easily diagnosed by digital examination, proctoscopy and biopsy. Any case with blood in the stool warrants a proctoscopic examination.

The trend toward sphincter saving operations is unfortunate and there is now no proof of higher longevity and lower morbidity and mortality. The Miles operation is the greatest contribution to rectal surgery. A colostomy needs no defense.

Polyps of the colon and rectum are pre-cancerous lesions. Seventy percent of the cancers of the rectum and colon occur from the sigmoid to the anal canal; 71 percent of the polyps occur in the same area—a significant fact. In the case of a lone pedunculated polyp high in the rectum with a frozen section diagnosis of adenocarcinoma Grade 1 or Grade 2, one is justified in excising the polyp with a wide bit of mucous membrane around the base. When careful microscopic investigation shows no invasion of the base of the polyp, enough has been done.

Changes in bowel habit have been overstressed as presenting symptoms. Bleeding is a most frequent symptom which brings these patients to the doctor. Proctoscopic and digital examinations should be done before barium enema, and this should be done before barium is given by mouth.

It is suggested that the recto-sigmoid juncture be regarded as an area about two inches long, partially inside the peritoneum and partially below the peritoneum. For cancers which are not at least one to two inches above the peritoneum the Miles procedure is the most satisfactory, and all of those below this point should be operated upon by a radical procedure, preferably of the Miles type. When the lesion is more than one to two inches above the peritoneal fold, one is justified in doing a resection and restoration of continuity by suture.

The prognosis of cancer of the rectum is good. The average duration of symptoms is ten and one-half to eleven months. Of 167 cases, 62 percent were alive and well after three years and 57 percent after five years.

VICTOR T. HUDSON

The Nature of Lateral "Aberrant" Thyroid Tumors. Warren, Shields, and Feldman, J. D., *Surg. Gynec. & Obst.*, 1948, 88:31-44.

The authors present 57 cases of lateral thyroid tumors of the neck. An analysis of their microscopic findings indicates that most of these lateral tumors are metastases from cancers of the thyroid gland. The primary cancer of the thyroid is not infrequently quite small and may be overlooked both clinically and at surgical exploration. The most usual cancer is that of the papillary type. Histologically, the lateral growths were identical with that of the primary. Surgical removal of the cervical lymph nodes and the thyroid gland must be complete to prevent local recurrence. This type of tumor has not been found to be associated with evidence of hyperthyroidism and generally they tend to occur in a younger age group.

W. R. LOVELACE

Indurated Leg and Leg Ulcers. Mahorner, Howard. *Surg. Gynec. and Obst.*, 1948, 88:115.

Nine factors which influence the development of indurated leg and ultimately lead to leg ulcer are: 1. postthrombophlebitic edema; 2. varicose veins; 3. obesity; 4. trauma; 5. infection; 6. lymphedema; 7. immersion leg; 8. arteriovenous communications; 9. systemic causes. Usually two to four of the factors are responsible in any case of leg ulcer. Trauma is emphasized as is also the presence of trychophyton infection. Skin grafting is recommended for larger ulcers. Ligation of varicose veins is urged for therapeutic and not cosmetic reasons.

Conditions such as immersion foot and arteriovenous communications are discussed. Excision of subcutaneous tissue in lymphedema is advocated. Correction of various distant causes of poor circulation may help. The author favors dried blood cells as a dressing in conservative management of leg ulcers.

M. T. FRIEDELL

The Roentgenographic Appearance of Renal Cancer Metastasis In Bone. Sherman, Robert S., and Pearson, T. Arthur, *Cancer*, 1948, 1:276.

Clinical and x-ray diagnosis of renal cancer metastases in bone is difficult. Some of the factors responsible for this difficulty is the tendency of some primary renal tumors to remain silent or grow rather slowly and the rather high percentage of solitary metastasis to bone (about 60 percent in this series). In an effort to improve the roentgenographic diagnosis of renal cancer metastases in bone, the authors reviewed 36 proved cases of such metastases from the files of the Memorial hospital for the Treatment of Cancer and Allied Diseases.

The metastases of renal cancer to the bone are characterized by the following feaures: the tumors are medullary in origin, oval in configuration, predominantly destructive to both medullary and cortical bone, and tend to form a periosseus mass. In tubular bones the position of the metastases was always symmetrical, or nearly so The boundary of the metastases is fairly apparent in many cases Fifty percent of the cases are complicated by pathological fracture The metastases have no significant predilection for any bone or any particular site in any bone Periosteal reaction is rare

There are three types of roentgenographic appearances (1) lytic, (2) septate, (3) patchy, in order of frequency of occurrence The lytic type is most predominant (75 percent in these series) and is characterized by predominant destruction of bone The patchy type is characterized by fine patchy areas of medullary bone destruction The lytic and patchy types are common appearances in a majority of cancer metastases to the bone of multiple primary origin The septate form which is characterized by an approximately equal degree of bone production and bone destruction, with an internal pattern made up of dense septa forming loculations is sufficiently distinctive to warrant suspicion of a renal origin for the primary tumor In some of the primary lytic types of bone metastases delicate indistinct and incomplete septa can be seen, which may be helpful in arriving at a correct diagnosis

Mention is made of the occasional pulsating bone metastases of renal cancer

W R Lovelace

The Treatment of Ruptured Liver with Absorbable Hemostatics George W Papen and Stanley Mikal, *New England J Med*, 1948, 239 920

Three cases of liver rupture by non penetrating violence are described in detail In each case the diagnosis was made preoperatively, and the continuing hemorrhage was successfully arrested by the use of packs of oxidized cellulose, alone or in combination with strips of gelatin sponge 'In all cases relatively complete hemostasis was obtained three to five minutes after the laceration had been packed with oxycel and gelfoam and gentle pressure applied No secondary liver hemorrhage ensued postoperatively Postoperative biliary peritonitis or fistula never developed when the abdomen was closed without drainage'

The management of these cases is reported in detail because previous reports of the use of absorbable hemostatics for liver hemostasis were mainly concerned with animal experimentation Other methods of control of liver bleeding involve attempted suture of liver parenchyma or the packing of the defect with muscle omentum or gauze The history of surgical hemostasis is outlined Animal fibrin was used as early as 1915 the present absorbable hemostatics were only lately developed

The incidence mortality, coincident depression of function and classification of liver trauma are discussed It is obvious that the high mortality which has been attached in the past to non penetrating injuries of the liver has been due to delay in exploration and to postoperative infection Ample supplies of blood avoidance of drains and adequate use of penicillin, combined with hemostatic methods not involving further damage to liver tissue should reduce mortality It is interesting to note that each of these three patients had preoperative scout films, both chest and abdomen preoperative blood and fluids gas gangrene and tetanus antitoxin It is not stated that penicillin was given preoperatively The postoperative course of the patient who had drainage of the peri hepatic region was startlingly different from that of the other two The conclusion states that closure without drainage is better

Louis Rivers

Treatment of Pruritus Vulvae by Local Inunctions with Pyribenzamine B Zondek, and Y M Bromberg, *Acta Med Orientalia,* July Aug 1948, 7 123

This work was conducted in Rothschild Hadassah University Hospital, Jerusalem It is brought out that the etiology of pruritus vulvae presents a definite problem and all factors local and general must be studied

Two patients suffering from pruritus vulvae due to allergy to endogenous hormones were treated by oral administration of anti histamine substances No effect on itching was noted Then pyribenzamine was applied locally on the vulvar region glycerine was chosen as the most suitable vehicle and pyribenzamine being soluble of anti histamine drugs

Fourteen patients from various etiologic factors were treated by local applications of three percent pyribenzamine in glycerine in various forms, every eight hours Six cases of itching receded completely, seven cases improved, one unimproved

The mechanism of action of local application is discussed It is emphasized that the effect is symptomatic only and last only as long as inunctions are continued

Edwin L Zander

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The Treatment of Ruptured Liver with Absorbable Hemostatics George W Papen, and Stanley Mikal *New England J Med*, 1948, 239 920

Three cases of liver rupture by non penetrating violence are described in detail In each case the diagnosis was made preoperatively, and the continuing hemorrhage was successfully arrested by the use of packs of oxidized cellulose, alone or in combination with strips of gelatin sponge 'In all cases relatively complete hemostasis was obtained three to five minutes after the laceration had been packed with oxycel and gelfoam and gentle pressure applied No secondary liver hemorrhage ensued postoperatively Postoperative biliary peritonitis or fistula never developed when the abdomen was closed without drainage

The management of these cases is reported in detail because previous reports of the use of absorbable hemostatics for liver hemostasis were mainly concerned with animal experimentation Other methods of control of liver bleeding involve attempted suture of liver parenchyma or the packing of the defect with muscle omentum or gauze The history of surgical hemostasis is outlined Animal fibrin was used as early as 1915 the present absorbable hemostatics were only lately developed

The incidence mortality, coincident depression of function and classification of liver trauma are discussed It is obvious that the high mortality which has been attached in the past to non penetrating injuries of the liver has been due to delay in exploration and to postoperative infection Ample supplies of blood avoidance of drains and adequate use of penicillin, combined with hemostatic methods not involving further damage to liver tissue should reduce mortality It is interesting to note that each of these three patients had preoperative scout films both chest and abdomen preoperative blood and fluids gas gangrene and tetanus antitoxin It is not stated that penicillin was given preoperatively The postoperative course of the patient who had drainage of the peri hepatic region was startlingly different from that of the other two The conclusion states that closure without drainage is better

LOUIS RIVERS

Treatment of Pruritus Vulvae by Local Inunctions with Pyribenzamine B Zondek and Y M Bromberg *Acta Med Orientalia,* July Aug 1948, 7 123

This work was conducted in Rothschild Hadassah University Hospital Jerusalem It is brought out that the etiology of pruritus vulvae presents a definite problem and all factors local and general must be studied

Two patients suffering from pruritus vulvae due to allergy to endogenous hormones were treated by oral administration of anti histamine substances No effect on itching was noted Then pyribenzamine was applied locally on the vulvar region glycerine was chosen as the most suitable vehicle and pyribenzamine being soluble of anti histamine drugs

Fourteen patients from various etiologic factors were treated by local applications of three percent pyribenzamine in glycerine in various forms, every eight hours Six cases of itching receded completely, seven cases improved, one unimproved

The mechanism of action of local application is discussed It is emphasized that the effect is symptomatic only and last only as long as inunctions are continued

EDWIN L ZANDER

In Memoriam

ANGELO ADAM GALLO

M.D., A.I.C.S.

Dr. Angelo A. Gallo, 48, died recently at Pottstown, Pa., and was the first local surgeon to be elected to the International College of Surgeons. He graduated from the Hahnemann Medical college, Philadelphia, in 1926. Following his internship at the Hahnemann hospital, he went to the University of Vienna for a year of postgraduate study of surgery. Dr. Gallo began his medical career at Pottstown in 1934 as chief surgeon at the Memorial hospital, and after four years was transferred to the Pottstown hospital. One of the surgeon's proudest accomplishments was the development of the Women's Cancer Detection clinic at the Pottstown hospital, which he headed until his death.

MATTHEW JOHN HOENIG

M.D., F.I.C.S.

The field of coloproctology lost one of its valued contributors in the death of Dr. Matthew J. Hoenig, of Rochester, N. Y. Dr. Hoenig graduated from the University of Buffalo Medical School in 1919 and took his postgraduate work at the New York Polyclinic from 1928 to 1929. His hospital positions consisted of being attending senior coloproctologist at St. Mary's hospital, Rochester, 15 years; attending senior coloproctologist, Highland hospital, Rochester 15 years; and consulting proctologist, Monroe County hospital, 13 years. Dr. Hoenig was also a member of the American Medical Association, New York State and County Medical Societies, Rochester Academy of Medicine and the Rochester Pathological Society.

MIKLOS TEMESVARY

M.D., F.I.C.S.

It is with deep regret that we record the death of Miklós Temesváry, of Budapest, Hungary. A great force in establishing relations between the International College of Surgeons and the Hungarian surgeons and gynecologists, Dr. Temesváry received his education at Budapest, Breslau, Hamburg, and Pécs and graduated in 1922. He acquired his obstretrical and gynecological operative practice while training at Dresden, Direnze, and Breslau. Since 1927 he developed his activity at Budapest, at the Weiss Alice hospital and was appointed its director in 1947. The surgeons and gynecologists of the world have lost one of its most devoted and esteemed contributors.

WILLIAM J. CARSON

M.D., F.A.C.S., F.I.C.S.

Dr. William J. Carson of Milwaukee, Wis., died Feb. 14, 1949 at the age of 56. Dr. Carson was born in Pittsburgh and attended the Pittsburgh academy, the University of Pittsburgh and the University School of Medicine. In World War I, he served with the medical corps as a lieutenant at Fort Snelling, Minn., at the Rockefeller Institute and for several months overseas. After the war he became associate professor of pathology at the University of Maryland. Dr. Carson, Fellow of the International College of Surgeons, was also a member of the American Medical Association, the Wisconsin State Medical Association, and the Milwaukee County Medical Association.

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Original Articles

Actinomycosis Involving the Colon and the Rectum

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PADDINGTON, ENGLAND

ACTINOMYCOSIS occurs so seldom in the colon and rectum that no surgeon, even if he be a proctologist, is likely in a lifetime to see more than a few cases. In this condition all are equally inexperienced. The rarity of the disease in this region may be judged by the very few cases found in the records of hospitals devoted entirely to diseases of the rectum Only two cases could be culled from the records of St Marks hospital, London It is noteworthy that in several cases found in the literature the correct diagnosis was not made during life; that fact alone is a sufficient justification for its special consideration

The title of this paper is not actinomycosis of the rectum and colon, but actinomycosis *involving* the rectum and colon for the disease does not so much attack the bowel as the tissues around the bowel. This was well shown in the case recorded by Yeomans where the involvement of the perirectal tissues was more obvious than that of the wall of the rectum itself The purpose of this article is to show how those parts of the bowel may be implicated, what symptoms may arise, what conditions may be simulated, and what peculiarities may put the surgeon on guard. Finally I hope to mention what the prognosis has been in the past and in what way the outlook has been greatly improved during the last three years

There are many varieties of actinomyces, some aerobic, some anaerobic. The common type which grows on grasses and grains is seldom pathogenic to human beings who are usually attacked by the anaerobic, or microaerophilic form of actinomyces The aerobic form is frequently saprophytic and can easily be cultured but the pathogenic variety is difficult to grow and the organism is easily killed by drying. The common pathogenic type—actinomyces bovis of Wolff-Israel—is *often* resident in carious teeth but has never been found naturally growing outside the body. It is admitted that occasionally the aerobic form of the fungus does become pathogenic, but this fact does not justify us in thinking that the sucking of straws at one end or the wiping of the parts with hay at the other end of the alimentary canal, is often if ever the method of infection

The most common mode of entry of the fungus into the body is through the lining of the alimentary canal, but the lungs, skin and possibly the female genital tract are occasional routes of entry. More than half the cases of actinomycosis occur in the facial region as the result of infection from the mouth or pharynx. A few cases have been recorded in which the fungus has escaped from the stomach through a perforation and thereafter developed into a pathological lesion. Quite a considerable number of cases develop following an attack of appendicitis which allows the organism to escape and develop in the periappendicular tissues. Every surgeon must have met such cases and it is outside the province of this paper to describe the characters of actinomycotic infection in this region.

The colon and rectum are rare sites for *actinomycosis. I have only been able to collect* six cases to which the term primary actinomycosis of the colon might reasonably be applied. Those are the cases which were under the care of Pannett, Matyas, Konig, Querneau, Duttman and one which came under my own observation. In four of the six cases an actinomycotic mass was excised under the impression that it was a malignant tumor. In a fifth case the huge inflammatory mass was diagnosed as malignant but it was considered irremovable and inoperable. The sixth case, of which I have been unable to get a full record involved the transverse colon and stomach. Five cases involved the sigmoid region of the bowel.

The case which came under my own observation was that of a middle-aged man with a large abdominal mass for which a surgeon operated, but which he was unable to remove. He diagnosed malignant disease. X-ray treatment was recommended. A sinus formed from which the actinomyces was recovered. Treatment by penicillin caused the mass almost to disappear but the liver increased in size and an abscess ruptured into the thorax. Bilateral bronchiectasis developed and the patient coughed up much actinomycotic pus. Later a cerebral abscess caused Jacksonian fits and Sir Hugh Cairns excised a localized abscess from the left cerebral hemisphere. The patient still remains fairly well though he still coughs up some pus and takes penicillin by inhalation. The abdominal tumor completely disappeared.

We now come to actinomycosis of the rectal region which may present many diagnostic puzzles to the surgeon. In this region as in other parts of the alimentary tract the organism develops chiefly outside the bowel, may form hard masses which can easily simulate malignant disease, and usually, sooner or later, breaks down and discharges pus from which the fungus can be recovered.

Melchior divided cases of rectal actinomycosis into primary, in which the infection comes from the lumen of the rectum, and secondary in which it reaches the rectum from a focus elsewhere. He divided the primary cases into upper primary and lower primary according to that part of the rectum in which infection was thought to have taken place. This subdivision is in my opinion unnecessary for the upper group were almost certainly cases of secondary actinomycosis in which the infection came from some other part of the abdomen.

It is sufficient to recognize primary and secondary cases. From the literature and from personal inquiries I have collected a series of 40 cases in which the rectum has been involved in this disease. From a survey of the details provided (and they were in many cases very inadequate for accurate analysis) one can make the rough conjecture that 20 cases were primary and 20 secondary. In some cases the disease was so widespread that it was impossible to make a guess as to the source of origin. The age of the patients varied from 14 to 70 years.

PRIMARY ACTINOMYCOSIS OF THE RECTUM

It is not surprising that the actinomyces should cause lesions around the anal canal. Indeed it is strange that these lesions are not more common. The organism must frequently dwell in the rectal ampulla, for it often resides in the cecum and appendix, and must be carried down with the colonic contents. Minute traumata of the rectal mucosa must be fairly common, and secondary infection would be at hand to encourage any infective process. That it is rare seems to point to the development of some local immunity.

Melchior rightly points out that lesions having their origin in the rectal ampulla or anal canal present several characteristic features. The disease starts as a local perianal or ischiorectal abscess which bursts spontaneously; it is almost always subacute or chronic and the process tends to spread backwards and laterally rather than forwards, and often extends through the sacrosciatic foramen to the gluteal region He might have added that the diagnosis is always made at a late stage unless—as in the cases recorded by Poncet—the observer has a special interest in or experience of actinomycosis Occasionally abscess formation may be late and the chief lesion will then be a massive formation of hard wooden connective tissue by the side of the rectum Rarely the original perianal abscess may be more acute and painful but it soon becomes chronic The duration of the disease varies greatly It may run its course in two or 20 years There may be apparently great improvement yet at a later date severe recurrence may occur In one remarkable case of Poncet's a carcinoma developed at the site of the disease after many years

The diagnosis of primary rectal actinomycosis can only be made with certainty by identification of the fungus in the discharge, usually the characteristic granules give one the clue The disease may closely simulate malignancy tuberculosis, syphilis or sepsis and one must always be on the lookout for it It is seldom that the sigmoidoscope has been of use in diagnosis but the important exception was that of Sir G Gordon Taylor, for in his case the yellow granules could be seen shining through the superficial parts of the mucosa

The prognosis of primary actinomycosis of the rectum has, up to the present been bad In the case reports which give full details only four instances of apparent or prospective cure appear—those of Melchior Konig, Risak, and Steenrod Even in these cases one could not be certain that recurrence might not take place, for the after history of the cases of Risak and Konig is not given, and slight sinuses still remained at the time of reporting in the cases of Melchior and Steenrod

Risak's case deserves special mention In this case actinomycosis developed after an excision of the rectum for carcinoma in which a sacral anus had been left The patient presented himself a year later complaining of incontinence, so the stump of the anal canal was anastomosed to the freed sacral anus In the thick tissue which intervened between the two parts of the bowel there was found a focus of actinomycosis It seems most likely that the infection had taken place at the time of the primary operation and had slowly developed The suggestion made by Risak that contamination of the wound (which was not quite healed when the patient left hospital) could have occurred from the grass which he might have used to wipe the parts round the anus, does not bear scrutiny, and infection from the unused natural anus would be most unlikely

Secondary actinomycosis is that form in which the disease spreads to the rectum from a focus somewhere else in the abdomen This focus is most commonly the appendix but there are several cases in which the rectum was invaded secondarily to the ovaries which of course may possibly have been infected in the first instance from the appendix Finally there is one interesting case in which the rectal disease was secondary to the perforation of a gastric ulcer, which presumably gave the opportunity for the fungus to escape and drop down to the pouch of Douglas There are a few cases in which it appeared likely that the fungus might have escaped from the iliac colon

The characteristic feature of most of the secondary cases is the definite history of an attack of acute abdominal pain with fever and sometimes vomiting sometime prior to the onset of the rectal symptoms The time interval between the acute abdominal crisis and the secondary rectal symptoms has usually been from three to six months It is interesting to record that Melchior, in describing cases in which he thought primary infection had occurred high up in the rectum expressed himself as puzzled to account for the previous occurrence of acute symptoms indicative of peritonitis, he did not appreciate the possibility, or probability that these were in reality secondary cases following the escape of the fungus from another part of the bowel

It is not unknown for the site of entry or escape of the fungus to heal completely In the case recorded by Barth, the illness started with tenesmus and the passage of mucus followed by acute abdominal pains, fever, and an abscess in the lower abdomen At the autopsy, 15 months later, the rectum was fixed in a mass of hard actinomycotic tissue The 10 cm long appendix, which contained a soft concretion, was firmly adherent by its tip to the rectum, and there was found a communication between the lumen of the rectum and that of the appendix by a narrow channel at the site of adhesion. There can be little doubt that the primary infection was through a perforation of an acutely inflamed appendix. The appendix at the time of autopsy was free from all signs of disease.

The case of rectal actinomycosis, secondary to perforation of a gastric ulcer, caused great difficulty in diagnosis; the hard mass felt bulging into the anterior wall of the upper rectum even caused the possibility of a retained swab to be considered. Exploration proved this an incorrect supposition, but the true diagnosis was only made when secondary actinomycosis abscesses were discovered in the liver.

Symptoms Caused by Actinomycosis of the Rectum: With what symptoms may a patient suffering from actinomycosis of (or near) the rectum come to the proctologist? Usually with one of the following—pus, muco-pus, or mucus in the stools; diarrhea, constipation, or diarrhea alternating with constipation; suppuration by the side of the rectum or anus; obstruction of the large bowel with abdominal distension; piles or fistula, or it may be that in a routine examination of a patient with lower abdominal tumor, the observer may find a swelling bulging into the rectum on its anterior, lateral, or even posterior wall, or maybe all around it.

Such a diversity of possible symptoms shows that there is nothing truly characteristic, therefore one should always entertain the possibility of actinomycosis in any difficult or doubtful case. The necessary means to diagnose it from syphilis, tuberculosis, amoebiasis, malignant disease and chronic pyogenic conditions need not be elaborated here. The only certain diagnosis is by the finding of the organism, usually in the little granules which are easily seen in the pus. In those cases in which the hard mass softens very slowly one may have to wait months before any pus may present itself for examination. Microscopic examination of a piece of the hard tissue may not show any fungus unless numerous sections are scrutinized. It is well always to make an attempt to culture the organism, and one must beware of being misled by the occurrence of an occasional filament of a saprophytic actinomyces in the pus. There are no reliable blood-tests for infection by actinomycosis and in making my list I have excluded several cases in which the only indication of the disease was a blood-reaction.

The outlook for patients suffering from rectal actinomycosis has, until recently, been grim. Most of them have succumbed sooner or later for the number of cures could be counted on the fingers of one hand. The methods of treatment have been varied. Potassium iodide has been the main drug used in spite of the fact that it is not a specific; it certainly seems to soften the mass but does not cure. In any case there is no need to give large doses. Ten grains, three times a day in a glass of milk, should be sufficient. Five or 10 drops of tincture of iodine in the same medium is also good. Radiation by intensive or graduated doses of x-rays sometimes benefits. In a few cases radium has been of assistance. Antiseptics, such as copper sulphate and formalin, are painful and unnecessary. Vaccines and sera are of little avail. Lately the sulphonamide group of drugs have proved of some use, but chiefly to combat secondary infection.

Most of the pathogenic varieties of actinomycosis are sensitive to penicillin. During the last three or four years I have seen some remarkable effects of penicillin upon certain cases of actinomycosis. In giving the drug for this disease it is essential that it be given in large doses for long periods of time without any intermission. It is of little use giving a short intensive course. The patient should be given half a million or a million units daily for a period of one month, two months or even three months. I do not give it three-hourly for this is very irksome to the patient. One can give two or three large doses daily in concentrated form. A little local anesthetic can be combined with the drug so that the injection (intramuscular) will be almost painless. Penicillin holds out the possibility of overcoming this fell disease which previously resisted most of our efforts.

The Surgery of Sepsis

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NO GREATER revolution in surgical treatment has occurred during the past 10 years than in connection with sepsis. This has resulted largely from the introduction of chemotherapy and biotherapy, for the introduction of sulphonamides, penicillin, streptomycin and other substances which profoundly affect biochemical reactions both of the leucocytes towards bacteria and of the bacteria themselves has modified the surgical treatment necessary in the management of these previously dreaded conditions of sepsis.

We know the properties of the sulphonamides, of penicillin and of streptomycin. We know that while the sulphonamides and streptomycin can be taken by mouth, penicillin is destroyed by the gastric juices and to attain sufficient concentration in the blood to be lethal to bacteria it is necessary to give it intramuscularly or intravenously. But one must remember some of the snags which may result from the indiscriminate and careless use of these substances. First one must remember that they are selective in their action on certain bacteria, and fortunately, to a great extent complementary. Penicillin is particularly effective in dealing with staphylococci and not without considerable effect on streptococci, gonococci and *spirochaeta* of syphilis; likewise the meningococcus and the micrococcus catarrhalis are to some extent sensitive. Sulphonamides on the other hand while lethal to streptococcus, gonococcus and bacillus coli have little or no effect on the staphylococcus and none at all on the bacillus typhosus in which last they resemble penicillin. Streptomycin has a marked reaction on the bacillus pyocyaneus and bacillus coli, but very little effect again, if any, on the bacillus typhosus although its derivative, chloromycetin, is reported to have considerable effect on this last organism as well as on the bacillus pyocyaneus and the virus of typhus fever.

It is essential therefore to ascertain in all cases of infection the etiological microorganism in order that the suitably applicable remedy may be employed with success. The continued employment of any of these agents without a rapid and obvious improvement in both the general and local condition of the patient, and a fall of temperature and pulse, is a clear indication that no effect is being exercised on the causative organism. In these cases and if these results are not noted within 48 hours of the commencement of treatment, this should be stopped, as certainly in the case of the sulphonamides severe toxic reactions may be manifest while in the case of penicillin and streptomycin it must never be forgotten that anaphylactic reactions not infrequently occur if a second course should be necessary.

The toxic effects of sulphonamides can be eruptions, cyanosis due to the formation of methemoglobin while if the fluid intake is not adequately maintained, albuminuria, headaches, edema and rarely uremia which is occasionally fatal, are by no means uncommon sequelæ, not only from over dosage but from an idiosyncrasy to these potent drugs. In the case of penicillin, reactions to the first series of injections are uncommon but at the second or subsequent courses of injections anaphylactic symptoms are not rare, and it is always wise to ascertain before starting a *repeat course, by intradermal injection of a* small dose to see if anaphylactic reactions are likely to occur.

The presence of an edematous ring around the dermal injection indicates generally that the patient must be gradually desensitized before full dosage is employed, otherwise general edema which may not infrequently cause urgent dyspnea, and severe pulmonary trouble, is liable to result, and may give cause to very grave anxiety, nor are such symptoms always controlled by the administration of adrenalin or some similar drug. The use in bulk dosage of streptomycin produces derangement of the semicircular canals so that the patient remains ataxic, and in many cases of meningitis the patient survives in a state of idiocy.

Finally, once pus has formed, i. e., an abscess is present, or a necrotic slough appeared in the tissues, no amount of chemotherapy will remove these; but they will continue to increase in size and spread locally, even though the contents may be apparently sterile. If this is not borne in mind fatal disasters, such as the bursting of a cerebral or mastoid abscess into the meninges or ventricles, may follow not infrequently. Bone necrosis will still occur in apparently controlled finger pulp infection, while the presence of an undetected sequestrum or slough will cause toxemia and subsequently severe local reaction, although for the time being both the patient's pain and local signs are frequently almost absent, a fact which often lulls the unsuspecting medical practitioners and the patient into a sense of false security—all too often dramatically shattered. All these substances depend on the blood stream to reach the area of infection, so that where there is no blood supply (gangrene) or a very poor one (chronic varicose ulceration with fibrosis) little or no result will follow their use. Lastly these substances do *not* penetrate from the general blood stream into the meningeal and pleural cavities, very slightly to the peritoneal, and only poorly to the synovial and bursal spaces. To be present in sufficient quantities to combat infection locally, penicillin must be introduced locally into the cavity and in sufficient quantity to reach all parts after pus, if present, has been withdrawn.

With these introductory cautions as to the limitations of the beneficial effects of the sulphonamide drugs, penicillin and streptomycin, it will be obvious to you that surgery still plays an important part in the treatment of all septic conditions. The surgeon must be alert if called in to septic conditions which have been treated already by one of those substances, for the absence of local signs and general improvement and the freedom from pain and temperature of the patient may lead to a slipshod examination in which he will fail to detect the presence of a local abscess or a sequestrum, both of which need surgical interference, not only for their security but for the safety of the patient's health and also his life.

One may now indicate briefly the management of the commoner septic conditions met with on the understanding that suitable chemotherapy will be employed on all occasions so that the local signs may be masked or absent.

Septicemia, Pyemia, Toxemia (Including Puerperal Sepsis): These three most dreaded conditions have lost much of their terrors under modern conditions and indeed are seldom brought to the surgeon where chemotherapy has been employed promptly and efficiently. It should be borne in mind that time is of great importance in securing the prompt control of the infection and while a blood culture is being prepared, both sulphonamide and penicillin should be administered together. Once the culture has been obtained, only the appropriate substance kept in continued use should be discontinued once the patient's temperature has been normal for 48 hours.

Boils: Boils and pimples, nearly always staphylococcal in origin, yield readily to penicillin treatment but if local pus exists, incision is essential to secure its exit and to let the local condition clear up. Such incision should not be made until the patient has been under the influence of penicillin for 48 hours at least, unless special conditions contraindicate. It should be remembered that recurrence of boils is frequent after penicillin therapy and that the second and subsequent attacks do not clear up with the same facility as the original attack. I have found it very valuable—should a second crop of boils occur—to supplement the penicillin therapy with a course of injections of stanoxyl and then take a bottle of stout daily for two or three months. For teetotalers a teaspoonful of brewers' yeast in milk can be substituted with equally good results. A similar line of treatment remains valuable in those addicted to carbuncles, and here a course of iron tonic in addition is frequently of great value.

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its removal But this should not be carried out until the patient has been under penicillin treatment for several days as the pain and toxemia will rapidly disappear even though the slough is still present Here again, other crops of carbuncles may occur after penicillin therapy In the case of carbuncle of the face or lip the old adage that surgical interference is contraindicated is still true

Erysipelas Here penicillin and sulphonamides not only clear up the condition rapidly but also prevent recurrences so often seen previous to the introduction of chemotherapy

Cavernous Sinus and Lateral Sinus Thrombosis These conditions, once fatal, now if promptly treated with large doses of penicillin and sulphonamide, have a very low mortality, and recovery is the rule in these previously serious cases But it must be remembered that the blockage of the efferent channels of the brain may cause some cerebral change and embarrassment which can be permanent

Suppurative Osteitis (or Osteomyelitis) Osteomyelitis has also lost much of its terrors and if promptly treated with penicillin therapy some 90 percent of the cases proceed to complete resolution If the sequestrum has formed, subsequent removal is required unless it is very small and nature removes it by the process of ulceration and absorption into the blood stream Septicemia which is always present in these cases is adequately controlled by penicillin Joint infections are unknown if chemotherapy is employed here and fatal results most uncommon

Penetrating Wounds of the Joints Wounds can be treated safely by fixation and extension in cases where chemotherapy can be administered Similarly, *extensive and even mildly infected wounds* can be sutured per primam after adequate excision and surgical cleaning, provided that no tension exists on the suture line either in the deeper or superficial tissues, while delayed second suture in 48 hours can be carried out with impunity in the presence of adequate chemotherapy

Acute Appendicitis and Subphrenic Abscess The use of chemotherapy, while diminishing the general toxemia and its inevitable masking the local signs, is not without risks For as already indicated, abscesses continue to spread and sooner or later will rupture, often with disastrous results, and its presence may be very difficult to detect Therefore, in acute appendicitis prompt surgery within the first 48 hours is still the golden rule of surgical procedure

Diverticulosis and Cholecystitis The administration of sulphonamide, in the form of sulphaguadine, does much to reduce the toxicity of the bowel contents and therefore lessen the severity of the symptoms This is also a wise precaution where practicable before any intestinal operation for resection or suture of the bowel wall In *general peritonitis* the administration of sulphonamide is indeed beneficial in combating toxemia Curiously enough, the addition of penicillin seems to enhance the good results obtained, but this administration in no way lessens the necessity for the removal of the cause of the peritonitis, nor diminishes the need for a continued intravenous administration of saline to replace fluids and chlorides, or the use of gastric suction to alleviate the patient's distress from the vomiting which is an otherwise distressing and exhausting symptom

Pulmonary Abscesses These are usually greatly benefited by chemotherapy which, by diminishing local inflammation, may enable them to be evacuated through the natural passages, usually by suction Should this not be possible incision and drainage are still necessary

Empyema This calls for surgical interference and drainage, and it must be remembered that if chemotherapy is to be of any value the substance must be introduced directly into the pleural cavity in sufficient quantity to come in contact with all the infected area, for as in meningitis these substances do not penetrate from the blood stream through the pleural or meningeal membranes There is some penetration through the peritoneum and somewhat more through the synovial membrane, but in all these cavities to enable really efficient results, the chemotherapeutic substance must be introduced locally and as already stated, in sufficient quantity to come in contact with all the affected area Needless to say, pus should be withdrawn in considerable quantities before the chemotherapeutic substance is introduced

It has long been my practice to empty the pleural cavity and close it completely. This was successful in some 70 percent of pneumococcal empyema and with chemotherapy it should be equally successful, if not more so, with all forms. Of course in empyema of long standing where the lung is tied down by fibrosis and thickened pleura, such treatment cannot be expected to be successful.

Meningitis: This has been successfully treated by the intracranial introduction of penicillin and also by intraspinal application, but it must be remembered that the brain cells are frequently damaged and the cerebral condition is by no means always normal if the patient survives. This applies equally to those cases of tuberculosis meningitis which have been treated successfully by streptomycin.

Venereal Diseases: Gonorrhea, syphilis, yaws and lymphogranuloma yield readily to penicillin (but no, or so little immunity results) so that second and subsequent infections are common. Sulphonamides are probably more efficacious in the treatment and cure of gonorrhea.

SUMMARY

An endeavor has been made to correlate the alteration in treatment of septic conditions due to the use of chemotherapy with the necessity for adequate surgery; and to show that the problems of diagnosis and treatment are even more difficult nowadays, due to the masking of physical signs and symptoms by the use of sulphonamides and penicillin.

RIASSUNTO

Richiama l'attenzione sopra le difficolta' di correlare opportunamente la cura chirurgica delle infezioni settiche con la chemioterapia.

La penicillina ed i sulfamilici aumentano infatti le difficolta' diagnostiche col mascherare i sintomi soggettivi ed obbiettivi.

SUMARIO

Se ha tratado de correlacionare el tratamiento de las condiciones septicas por la chemoterapia con la cirujia. Tambien se ha tratado de demostrar que los problemas diagnosticos y terapeuticos de estas condiciones es hoy en dia mas dificil debido al enmascaramiento de los signos fisicos pos los sulfonamidos y la penicilina.

SOMMAIRE

L'auteur nous a démontré les avantages dans le traïtement d'états septiques qu'il y a d'employer la chémothérapie associée à une chirurgie adéquate. Il démontré que le problème de diagnostique et de traitement est plus difficile de nos jours vus que les symptômes et les signes physiques sont masqués par l'emploi de sulphonamides et de la pénicilline.

Some Technical Considerations in the Resection of Carcinoma Involving the Lower Esophagus

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LONDON, ENGLAND

RESECTION of the lowest esophagus and upper stomach has now become a routine and reasonably safe operative procedure, and so it is well to consider the various technical details with the object of discovering how we can improve the operation. The desire is to make the operation more radical, in order the limits of resection, thus increasing the operability rate, and making the operation safer.

With these desiderata in mind, I would like to discuss two points, first the extent of the procedure in patients with carcinoma of the upper stomach and adjacent esophagus, and second the anastomosis

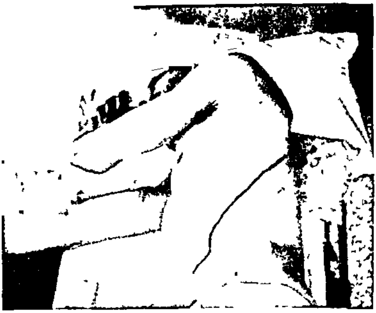


Fig 1 Outline of the abdominothoracic incision

I do not propose to discuss the approach beyond restating my preference for the abdominothoracic approach to tumors of this region (Fig. 1). The abdominal part is a left sided transverse incision commencing midway between the xiphoid process and the umbilicus and the thoracic part is an extension of this incision into the seventh, eighth or ninth intercostal space, dividing the diaphragm back to the esophageal hiatus.

THE EXTENT OF THE OPERATION

In cases of adenocarcinoma of the upper stomach invading the esophagus, apart from invasion of the blood stream and of the lymphatics, there are four typical routes of extra gastric spread which will require the surgeon's careful attention if complete eradication of growth is to be attained.

The first is by direct invasion of the diaphragm in the neighborhood of the esophageal hiatus This is so common, and even occurs with the squamous celled tumors of the lower esophagus, that I believe that a ring of diaphragm—the circumference of the esophageal hiatus, should be excised as routine procedure in all carcinomas which involve the part of the esophagus passing through the diaphragm This is not difficult and needs no description The branches of the inferior phrenic vessels are met on more than one occasion, for they approach close to the esophagus On the posterior aspect of the esophagus great care is necessary because there is so little diaphragmatic tissue between the esophagus and aorta

The next point is the upper part of the gastrohepatic ligament Here again neoplastic thickening extending into the hilum of the liver is so common that all but the lower part of the gastrohepatic ligament should be removed as a routine, even in the earlier neoplasms in this area, severing the ligament flush with the liver.

We are indebted to Professor Michel for his contribution on the vascular abnormalities which may be encountered here, and we must bear these in mind.

Third, and most important because it is very common, is by posterior invasion of a growth of the upper stomach into the peritoneum of the posterior wall of the lesser sac or into the pancreas itself. This extension by

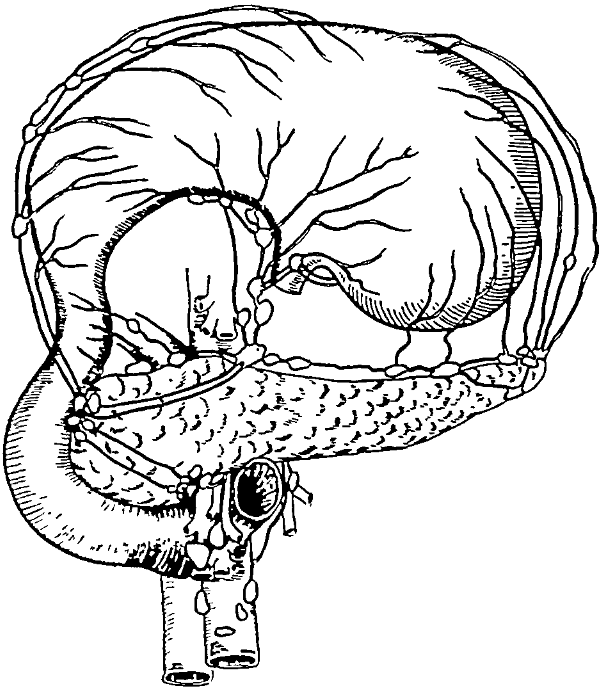


Fig. 2. The gastric lymphatic drainage.

no means renders a case inoperable. In such cases or even in cases where the growth has only invaded the peritoneum of the posterior wall of the stomach, I make a routine resection of the posterior wall of the lesser sac with or without hemipancreatectomy.

After freeing the growth from the diaphragm and freeing the great omentum from the transverse colon I make an incision in the peritoneum lateral to the stomach and spleen, and then strip this peritoneum medially. This brings one behind pancreas and behind the lesser sac of peritoneum. Sometimes the adrenal is attached to the tumor and in such a case it can be removed without ill effect. Next the dissection is continued until the celiac axis is met and here first the splenic and then the left gastric arteries are divided at their origin. The splenic vein is divided just before its junction with the inferior mesenteric vein and at this level the pancreas is transected, thereby removing a little over one half of the organ. The rest of the operation proceeds as usual.

Apart from the obvious advantage of removing the peritoneum and the organ into which the gastric growth is tending to spread directly, this operation removes a great deal more of the glandular field (Fig. 2). Many of the lymphatics from the greater curvature side of the upper stomach pass to the region of the splenic hilum and hence to the glands above the left half of the pancreas and both of these extensions are ablated by the operation. In less advanced cases, it is of course possible to spare the pancreas and just remove the peritoneum of the lesser sac lying above it.

A less common and important extension is invasion into the liver. Most such cases are so advanced that distant glandular and peritoneal metastases make further surgery futile. Occasionally a type of growth is encountered which tends to extensive local invasion without widespread peritoneal or glandular invasion and in such cases partial hepatectomy is worth while. The liver is first transfixed with multiple mattress sutures and then transected removing part or most of the left lobe; this is not

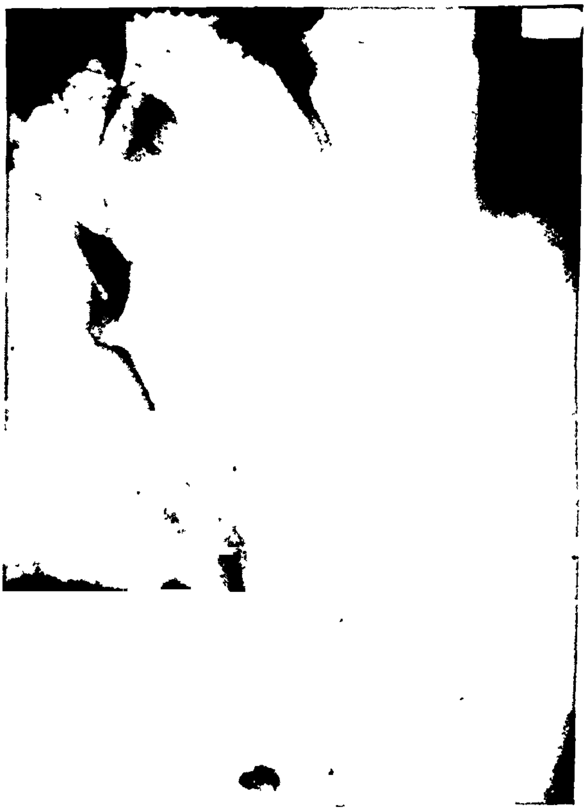


Fig. 3. The classical method of inserting the esophagus into the anterior surface of the stomach (postoperative x-ray).

usually a matter of grave operative difficulty It requires more optimism and patience on the part of the surgeon than special technical skill.

No ill effects follow hepatectomy but some slight increased looseness of the bowels may follow the pancreatectomy if a wide gastrectomy is also required, but even if total gastrectomy and hemipancreatectomy are done, no severe diarrhea occurs

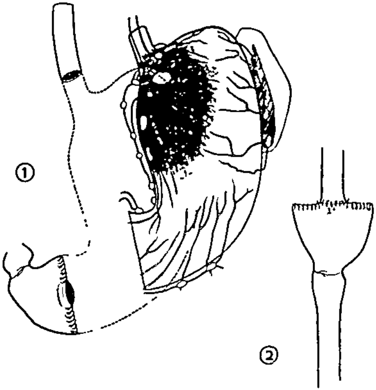


Fig 4. Resection of the greater part of the stomach with author's method of end to end anastomosis

TECHNIC OF ANASTOMOSIS AFTER RESECTION

It has become a routine surgical practice to close the cut end of the residual stomach and to anastomose the cut end of the esophagus to an opening in the anterior wall of the stomach (Fig 3). For some reason anastomosis to the cut end of the stomach has been frowned on. In my last 12 such resections I have used an end-to-end anastomosis, and have found that as well as enabling one to resect more stomach—an important point in adenocarcinoma of the cardia, it also makes a most excellent functioning stoma, and I have always been able, postoperatively, to pass a full sized esophagoscope through it with ease.

The technic of anastomosis varies, depending on the amount of gastric tissue removed. If most of the stomach is removed, a triangular part of the pyloric antrum is left (Fig. 4).

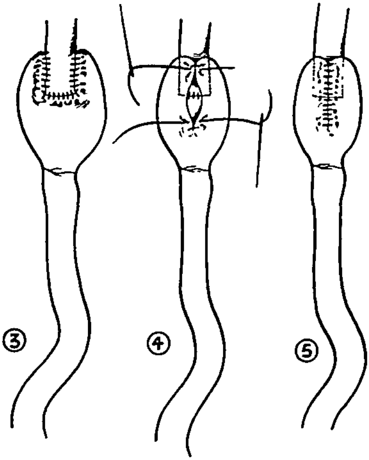


Fig 5 Same as Fig 4

The method of closure I have found secure in such a case is to close part of each end of the cut surface and anastomose the esophagus to the middle part. The two angles left are then brought against the side of the esophagus and sutured to it, thus greatly strengthening the anastomosis (Fig. 5)

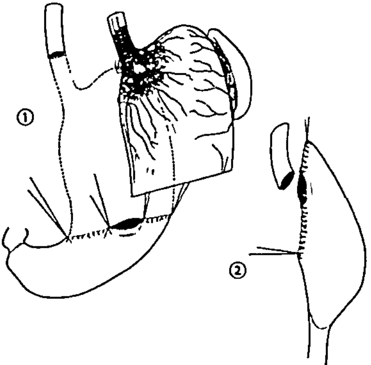
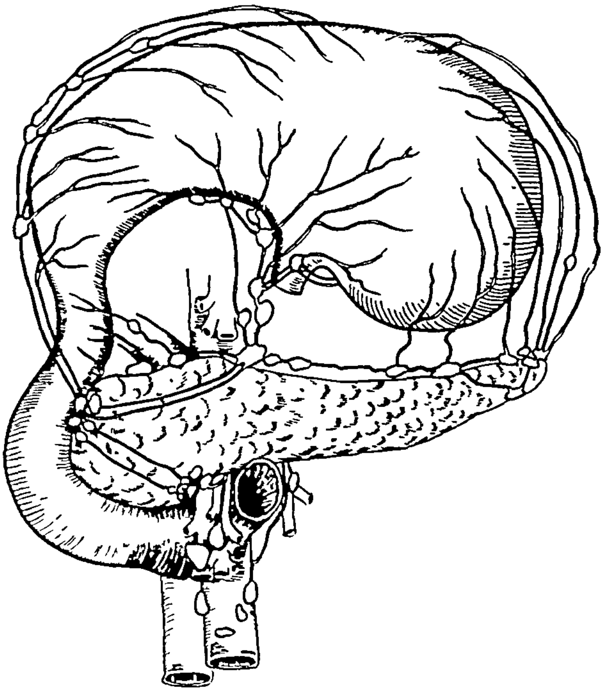


Fig 6 Author's method of end to end anastomosis where less stomach is removed



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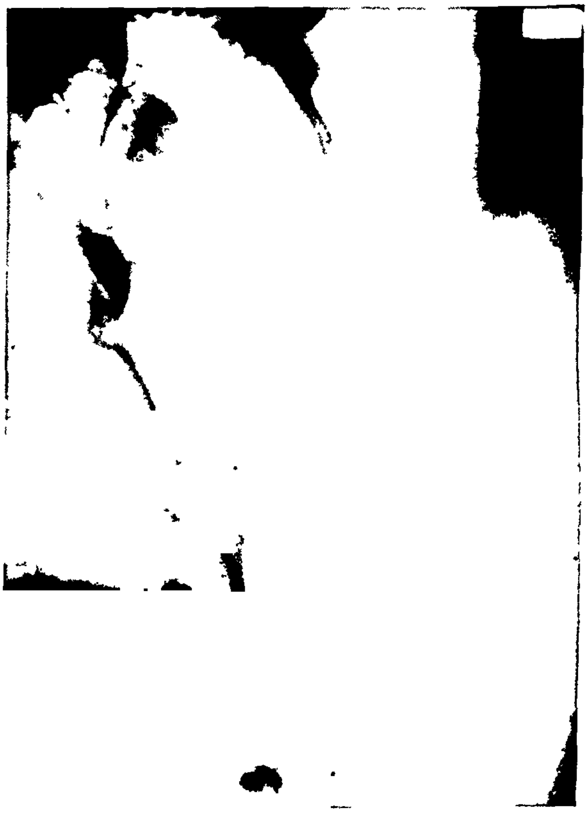

Fig. 3. The classical method of inserting the esophagus into the anterior surface of the stomach (postoperative x-ray).

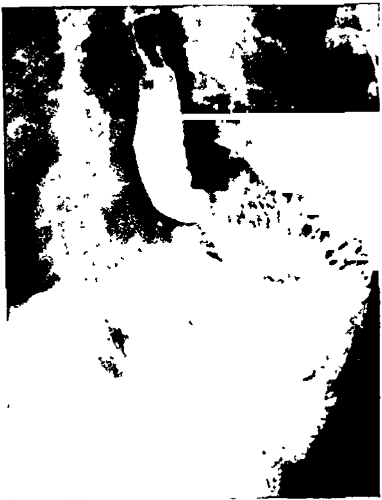

Fig. 11. Postoperative x ray after total gastrectomy, hemipancreatectomy, removal of lesser sac, with end to end esophagojejunostomy.

In the more extensive upper gastric neoplasms it is necessary to remove the whole stomach (Fig. 9). In these cases I have for the last two years made a habit of transecting the jejunum and mobilizing it after the method of Roux, and making end-to-end esophagojejunostomy (Fig. 10). This undoubtedly leaves the safest and most comfortable reconstruction possible after total gastrectomy (Fig. 11).

In all these anastomoses the part anastomosed to the esophagus is drawn well up and then anchored to the mediastinal pleura, to obviate any tension. I think it is most important however not to stitch the pleura too snugly and so close off the mediastinum completely or a closed mediastinal infection may become possible. The mediastinum must be left free to drain into the pleural cavity. Any pleural exudate can subsequently be removed by aspiration for I believe that it is safer to aspirate postoperative pleural exudate than to leave in a pleural drain.

I have dealt with one or two of the many points in this interesting subject, but only by pooling our personal experiences and relating our troubles and successes, will progress be made.

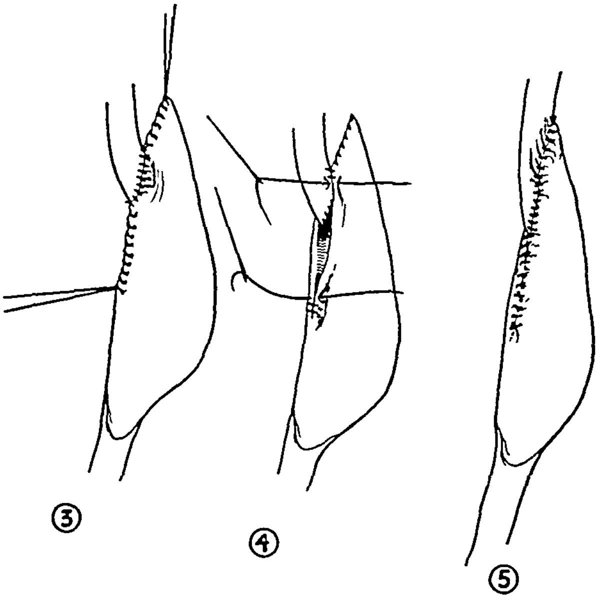

Fig. 7. Same as Fig. 6.

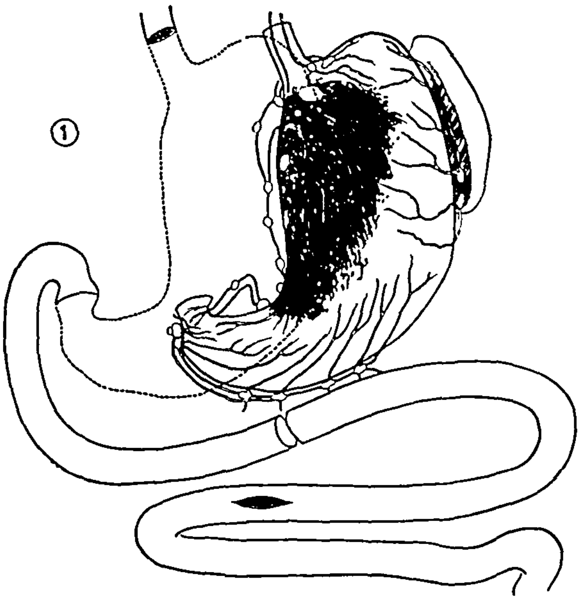

Fig. 9. Total gastrectomy with end to end Roux' type esophagojejumostomy.

If much of the stomach is conserved, as is permissible in the case of squamous celled tumors of the lower esophagus (though the glands around the left gastric artery must always be removed) then an oblique cut end results (Fig. 6). Much of the lesser curve side and a minimum of the greater curve side is closed and again an end-to-end anastomosis is made. This gives added length to the stomach enabling the anastomosis to be made with less tension. The lesser curve side is then inverted, the greater curve end is stitched against the side of the esophagus to take off the strain (Fig. 7), and if possible a third row of sutures is used to give added safety (Fig. 8).

Fig. 8. Postoperative x ray showing end-to-end esophagogastrostomy.

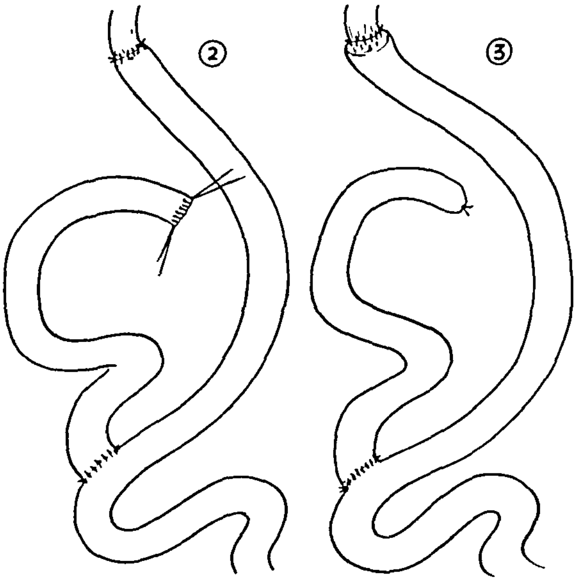

Fig. 10. Same as Fig. 9.

it is the responsibility of the surgeon to develop a technic that should assure a cure and prevent serious complications.

The type of anesthesia is an important factor in thyroidectomy. For many years we have found ourselves using local procaine anesthesia for our very sick patients, whereas we often combine this with superficial cyclopropane and oxygen inhalation anesthesia in the more simple types Local anesthesia alone however has many advantages and we have found ourselves using it to a steadily increasing degree. It gives a sense of satisfaction to have the patient speak when working in the immediate vicinity of the recurrent laryngeal nerves and this is not possible when an intra tracheal tube is 'in situ'.

The diagnosis of frank hyperthyroidism, whether of the diffuse or nodular type is fairly well standardized, but the same cannot be said of the more atypical forms. This applies more commonly to the nodular goitres.

There seems to be a prevailing opinion that if the B.M.R. is not abnormally elevated the goitre may be ignored. It is quite common to find these old nodular goitres existing for years while the patient becomes progressively more weak and disabled Auricular fibrillation may develop and congestive heart failure ensue before the patient is referred for surgical treatment. During this time these people may complain of pain in back and the older type sometimes notices that they are developing a kyphosis of the thoracic spine An x-ray study will occasionally disclose considerable demineralization of the vertebrae and sometimes a compression fracture of one or more vertebral bodies Other bones may be involved also

It has been known for a long time that hyperthyroidism increases the excretion of calcium both by the urine and faeces, whereas in hyperparathyroidism the abnormally excessive excretion is through the kidney alone, and is more rapid than in hyperthyroidism. For these reasons, renal calculi are much less common in the latter condition. In hyperthyroidism the serum calcium and phosphorus seem to remain within normal limits whereas in hyperparathyroidism the serum calcium goes up and serum phosphorus goes down.

It is suggested that when investigating osteoporosis, hyperthyroidism should be thought of as a cause. This condition occurs only after an active goitre has existed for some years and in the nodular type the B.M.R. may be within normal limits Following thyroidectomy the pain in the back, hip or feet disappears and recalcification takes place slowly.

Hyperthyroidism and so called nontoxic nodular goitre are found not uncommonly in association with such diseases as hypertension, organic heart disease, either rheumatic or sclerotic in character. In the latter, anginal pain may occur on exertion. Removal of the goitre in such patients takes a great load off the heart and makes it much easier to handle the associated disease. To this group should be added diabetes mellitus, which ordinarily is aggravated by toxic goitre.

Carcinoma of the thyroid when seen, is usually secondary to an adenomatous goitre and the solitary adenoma is more prone to malignant degeneration. Surgery is the only known cure for adenomatous goitre and when this is accepted more generally the incidence of thyroid carcinoma will fall sharply.

Aberrant thyroid nodules should be removed, they are commonly malignant, usually of the papillary carcinomatous type. The prevailing but not universal opinion is that they are metastatic growths from a malignant nodule in the thyroid lobe of the same side so that this lobe should also be removed and a search made for the primary growth.

In the last few paragraphs I have tried to stress the importance of recognizing the potential for morbidity of and damage to vital structures and functions of the human body, which is inherent in the so called nontoxic nodular goitre. Indeed these are the neglected people, many of whom have carried their burdens masked to themselves as well as their physicians until over the years of semi-invalidism cardiac decompensation develops or a chance x-ray plate for pain in the back discloses a decalcified vertebral column, with perhaps a compression fracture of one or more vertebrae.

The patient would be spared these years of fatigue and misery as well as the final collapse, if we all recognized that the old nodular goitre has a potential for causing a heavy dis-

The End Results of Thyroidectomy

GORDON S. FAHRNI, M.D.
WINNIPEG, CANADA

THE introduction of the use of thiouracil and later propylthiouracil in the treatment of hyperthyroidism a few years ago, brought with it the hope that this drug might usher in a medical cure for this disease. The administration of either of these drugs causes a great change in the structure of the thyroid gland. Colloid with its iodine rapidly disappears from the gland. The whole thyroid becomes more vascular and the epithelial cells become taller and increase in number. The drug is thought to interfere with the production of thyroxin and this activates the thyroid stimulating hormone of the pituitary gland which in turn causes the histological changes mentioned above.

Throughout this change there is a definite clinical improvement in the hyperthyroid patient. During this improved clinical picture the patient gains weight and the pulse rate comes down; the laboratory findings are usually routine, the basal metabolic rate comes down at the rate of something like one percent per day on 50 mgm. of propylthiouracil, four times daily or on a dose of 0.2 gm. thiouracil, three times daily. The protein bound iodine of the blood decreases and a more normal balance in nitrogen, calcium, phosphorus and cholestrol is established.

In the use of thiouracil it is important to watch for complications, the most frequent and serious of which is agranulocytosis. Less commonly found are sore throat, fever, lymphadenitis, salivary gland enlargement, skin rash or nausea and vomiting. More rarely yellow atrophy of the liver has been encountered. It has been found that these complications are met with much less frequently when propylthiouracil is used. Unfortunately, it has been found that although the clinical improvement is fairly constant under treatment with either of these drugs the goitre does not disappear, indeed it may become larger. When the drug is discontinued a large percentage of hyperthyroid patients relapse and some have done so while still under treatment. Throughout treatment it is important to watch for complications.

The uncertainty of the final result of treatment of hyperthyroidism with these goitrogenic drugs has led most observers to feel that subtotal thyroidectomy should be done when the patient has made the usual preliminary improvement.

These drugs cannot be expected to destroy the adenomatous goitre whether toxic or nontoxic, so that surgery still remains the only adequate procedure for the cure of this disease.

Because of the fairly constant reduction of hyperthyroidism by these drugs, they have been of great help in preparing the very sick hyperthyroid patient for surgery. Indeed it has meant that these patients may now undergo thyroidectomy without the fear of postoperative hyperthyroid crises which formerly was the chief cause of death following this operation.

One disadvantage in the use of propylthiouracil is the length of time taken to prepare the patient for operation. For this reason many of us still depend on the known improvement under Lugol's solution preoperatively over a period of eight to 12 days, instead of waiting for as many weeks to get the maximum benefit from propylthiouracil. This is particularly important when patients come from a distance and when hospital beds are in such short supply. In the sicker patients however it is important to accept this prolonged preoperative treatment with propylthiouracil in the interest of safety in operation. We have thought that even when prepared in this way it is beneficial to administer Lugol's solution for a week before thyroidectomy. In addition to improving the resistance of the patient to operation, the involutional change brought about by iodine makes the goitre more easily handled at operation.

With the threat of thyroid crisis eliminated it is the responsibility of the surgeon to develop a technic that should assure a cure and prevent serious complications.

The type of anesthesia is an important factor in thyroidectomy. For many years we have found ourselves using local procaine anesthesia for our very sick patients, whereas we often combine this with superficial cyclopropane and oxygen inhalation anesthesia in the more simple types. Local anesthesia alone however has many advantages and we have found ourselves using it to a steadily increasing degree. It gives a sense of satisfaction to have the patient speak when working in the immediate vicinity of the recurrent laryngeal nerves and this is not possible when an intratracheal tube is 'in situ'.

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The patient would be spared these years of fatigue and misery as well as the final collapse, if we all recognized that the old nodular goitre has a potential for causing a heavy disability in the face of a normal or lower than normal basal metabolic rate. This recognition should insure early removal of the offending nodular goitre, the only known cure as yet for this type.

In attempting to assess the present status of surgical treatment in diseases of the thyroid gland it might be pointed out that it is still pretty much indispensable to a cure in diffuse toxic goitre, while in the nodular goitres, whether toxic or not, no other means of cure is known.

Prior to the introduction of thiouracil and propylthiouracil the mortality from thyroidectomy had steadily dropped during the two preceding decades in the hands of those particularly interested and trained in this field of surgery. There still remained however a mortality of around one percent and upwards. In analyzing these deaths in our own practice and among those of some of our friends across the continent, it was found that the majority of them were due to hyperthyroid crises after operation.

Since the introduction of the goitrogenic drugs this complication has entirely disappeared, so that in the absence of faulty technic and reasonable care against postoperative thrombosis and embolism and lung complications, a death following thyroidectomy should be rare and indeed a good reason for a soul searching review of the management of the case.

We have entered the 'atomic age' and with it a period of intense research into the possibilities for good and evil of 'the splitting of the atom'. Isotopes of different types have been made available for medical research. Of these, radioactive iodine is receiving much attention at the hands of capable research groups in regard to its potential for therapeutic action on diseased conditions of the thyroid gland. The end results of these investigations are awaited with keen interest.

For Hotel Reservations
for
The Fourteenth Annual Assembly
United States Chapter
of the
International College of Surgeons

Write to:
David B. Allman, M.D.,
General Chairman of Arrangements
Hadden Hall, Atlantic City, New Jersey.

Vascularization of the Myocardial Capillary Bed by Arterialization of the Cardiac Veins: An Experimental Study*

JOHN D STENSTROM M D F R C S (C)
VICTORIA, B C

FURTHER studies on reversal of the circulation in the left ventricle have been made There is now some evidence that at least in some dogs the myocardial capillary bed can be perfused with arterial blood directed through the cardiac veins That this arterial blood is utilized by the myocardium is suggested by the fact that immediate or delayed ligation of a major coronary artery is not routinely followed by ventricular fibrillation or infarction[1,2,3,4,5] Arterialization of the cardiac veins requires complete occlusion of the coronary sinus plus an arterio-sinus anastomosis The effects of complete acute sinus occlusion and arterialization in a normal dog heart are serious and often fatal[2,4,5,6]

CORONARY SINUS OCCLUSION

The immediate effect of acute complete sinus *occlusion has been described by many* workers and is apparently common to most dogs[17] Following occlusion the sinus and superficial cardiac veins become markedly distended The entire left ventricle and the adjacent part of the right ventricle become cyanotic Veins previously not seen become apparent Occasionally petechial hemorrhages and larger extravasations appear under the epicardium adjacent to the turgid sinus and left ventricular veins The pressure in the sinus and cardiac veins is greatly elevated approaching or exceeding aortic pressure[13,1,18,19] Otto[1] records the results of sinus occlusion In addition to the usual phenomena—"the left ventricle and appeared functionless hanging like a distended sac from the contracting portion of the heart" Cohnheim[16] found that single cardiac veins could be tied without damage to the heart but that most hearts though not all, became cyanotic if the coronary sinus was obstructed In one half hour there was great bulging of the veins dilatation of the arteries and evidence of exudation of blood into the heart wall, the heart rate slowed and sometimes cardiac death ensued

Robertson[11,17] found that the immediate effect of obstruction of the sinus varied between both species and individuals in the same species Again the effect varied with the site of obstruction If the middle cardiac vein entered the sinus proximal to the occlusion it was separately ligated to occlude completely all venous drainage from the left heart wall, in some such hearts this final step brought about left heart congestion not previously present

In 90 percent of one series of dogs there were the typical changes In only 12 percent of another series did cyanosis occur with sinus occlusion This variation he felt, depended on how well the Thebesian vessels and anterior cardiac veins responded to the extra load on their ordinary function While the vascular changes were taking place clear fluid formed beneath the epicardium first along the larger vessels and then about smaller vessels He noted in several animals that after a 10 to 30 minute period of cyanosis and congestion, these and other signs of coronary sinus occlusion disappeared and the normal rate and contractility returned This was associated with a fall in coronary sinus pressure

The mortality rate consequent upon acute occlusion of the coronary sinus has varied considerably with different investigators Robertson[11,17] reported no deaths Cohnheim[16] and Otto[10] stated that some animals died but the numbers were not reported Beck[1,2,3] in a large number of experiments had a rate

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* Read before the Western Regional Group Meeting Medical Division Research Council of Canada, Saskatoon Sask Feb 24 1949

This work was done at the Royal Jubilee Hospital Victoria B C, with the aid of a grant from the Medical Division Research Council of Canada varying from zero to 15 percent. He occluded the sinus in 78 consecutive dogs without a death. He feels that in healthy dogs the sinus can be ligated with little or no mortality. Fauteux[20,21] reported a high mortality. Gross and co-workers[7, 14] had a mortality rate in their original series of 42 percent. In a later series this was reduced to 20 percent.

The later effects of complete acute sinus occlusion have been described by several investigators.[1, 9, 10, 11, 15, 17] Robertson[17] recorded the living and autopsy appearance of the hearts at varying periods after sinus ligation. Upon opening the chests of dogs 24 hours after sinus ligation had produced the typical acute phenomena of congestion, bradycardia, etc., a characteristic bruised appearance was noted in the left ventricle conforming to the area of venous distention and cyanosis. There were whorls of enlarged vessels over the apex and conus arteriosus. There were subepicardial accumulations of opaque fluid and grayish opacities—probably organized serous fluid. The microscopic picture of the bruised ventricle varied from early edema and cloudy swelling to typical necrosis of muscle similar to that described by Middleton.[22]

The necrosis usually existed only in the outer one-sixth of the left ventricle and was rarely found in the right ventricle. Some portions of the left ventricle were more severely damaged, necrotic patches extending as far as the mid-portion of the wall. In the outer half of the left ventricle there were greatly distended veins and capillaries, some of which had ruptured. There was extravasation of blood with rupture of surrounding muscle and elevation of epicardium from myocardium. The subepicardial space was filled with blood or a clear pink-staining fluid. Hearts exposed on the third day showed similar bruising. The necrosis was much more marked than previously and in some instances extended half-way through the ventricular wall.

Ruptured vessels with blood extravasation both superficially and deeply were apparent and there was beginning connective tissue reaction in the subepicardial blood or fluid. Such organization was also well started deeper in the wall in areas of hemorrhage, muscle rupture and necrosis.

Hearts exposed on the seventh day showed no bruising of the left ventricle. Microscopic examination showed swelling of muscle cells with occasional nuclear changes and separation of cells in the outer third of the wall. There were rare patches of necrosis. Hearts exposed four months later showed gray streakings and patches along the larger vessels with still evident whorls of vessels about the apex and conus. Microscopically subepicardial scarring corresponded to the gray streaks. There was myocardial scarring in the outer one-half of the left ventricle. Hearts examined at six months revealed subepicardial and myocardial scarring in the outer half of the wall. Robertson concluded that in some dogs coronary sinus occlusion causes left heart congestion and a moderate to severe degree of myocardial necrosis. Since no deaths occurred which could be attributed to these effects he felt that cardiac function was not gravely altered.

Fauteux[22] states that in most instances ligation of the coronary sinus at or near its opening into the right atrium results in a very severe congestion of the heart with disseminated areas of ecchymosis. This very often produces death. In certain of his experiments such ligation was well tolerated. This latter effect, he felt, was due to a difference in the coronary venous pattern whereby the coronary sinus was not draining as much blood as in the other dogs. It is because of the frequency of such deleterious effects that in his human operations the great cardiac vein rather than the sinus is ligated.

Otto[10] reported deaths from sinus ligation. Autopsy revealed the left ventricle hard and thick. The cut surface oozed blood. It was dark in color and presented an appearance not unlike that which is seen in chronic passive congestion.

Gregg and Shipley[15] ligated all grossly visible anterior cardiac veins, the coronary sinus and extracardiac veins. Both ventricles dilated, became very firm and markedly hemorrhagic. The hearts gradually stopped. Autopsy revealed extensive hemorrhage throughout the entire thickness of the right ventricle and the outer two-thirds of the left ventricle.

Similar ligations were done in two stages in chronic experiments Two months after the final ligation autopsy revealed extensive scarring, cellular infiltration and decrease of muscle in the right ventricle

Beck and Mako[9] found that the degree of venous engorgement after sinus ligation varied widely They observed the hearts at intervals At three to six days the veins were distended, the hearts enlarged and contractions were sluggish At two to six weeks the distention was still evident but less in degree At four months no venous distention was noted At autopsy in all hearts in which venous stasis had been produced there was evidence of fibrosis in the fat around the coronary artery This fibrosis was not found in the heart muscle

Beck and co workers[1] have found myocardial hemorrhage after sinus ligation Later they were able to ligate the sinus in 78 consecutive dogs without a death and without obvious ecchymosis The histologic appearances of these hearts are not recorded They concluded that the venous system could tolerate the increased pressure resulting from sinus occlusion

Grant and Jones[23] recorded an example of coronary sinus obstruction in a human heart The obstructing diaphragm, apparently the result of an organized thrombus, was situated to the left of the ostia of the posterior and middle cardiac veins This is not comparable to sinus occlusion to the right of the middle cardiac vein The obstructed portion of the sinus was enlarged, thickened and rugose while the unobstructed segment was normal The coronary arteries were normal and were presumably delivering a normal quantity of blood The only myocardial lesion that might possibly be attributed to the obstructed sinus was "a few small milk spots with underlying myocardial scars on the posterior surface of the left ventricle"

Studies on the dynamics of the coronary vascular bed after sinus occlusion have been made by several investigators[13, 15, 18, 19, 24] Immediately following complete sinus ligation there is a considerable reduction in left coronary artery inflow The coronary sinus and cardiac vein pressures rise from control values of 10/2 mm of mercury to figures which during systole approach or exceed the aortic systolic and whose diastolic value reaches 20 to 40 mm of mercury The retrograde blood flow is markedly elevated in the anterior descending branch of the left coronary artery from a maximal normal value of one cc per minute to values as high as 39 cc per minute This maximum peripheral flow is reached in from 10 to 30 minutes The blood is highly unsaturated containing only three to four volumes percent oxygen while the coronary sinus approximates eight volumes percent The marked elevation of the cardiac venous pressure which appears immediately after venous ligation disappears after a period of time, but the latter is still discernible after at least 30 days

VENOUS DRAINAGE OF THE MYOCARDIUM WITH CORONARY SINUS OCCLUSION

Robertson[11, 1] by means of serial sections of the ventricles demonstrated large vessels connecting the heart cavities with the epicardial vessels He also noted whorls of enlarged veins at the apex and conus arteriosus He felt that when the coronary sinus was closed the venous blood entered the heart cavities through Thebesian vessels and through anastomotic channels on the surface of the heart In some hearts after sinus obstruction—the typical changes of cyanosis, congestion and bradycardia were noted In others no change was noted He felt that in the latter instances the accessory channels dilated immediately to such an extent that all the venous blood was carried off In the former instances the dilatory process was slower In several animals he found that after a 10 to 30 minute period of cyanosis and congestion that these and other signs of coronary sinus blockage disappeared The coronary sinus pressure which was very high began to fall and reached a level equivalent to that in dogs in which sinus closure had caused no obvious heart change

Otto[10] felt that the Thebesian vessels acted in the presence of coronary sinus occlusion

Anrep, Blalock and Hammouda concluded that coronary sinus blood becomes diverted to Thebesian drainage channels

Gregg and Shipley[15] have suggested that the inner left ventricular wall and basal septum may have a separate venous drainage system, possibly involving Thebesian channels. They concluded that the communications between the Thebesian system and the superficial veins of the heart are not very extensive and feel that Thebesian channels play a very little role as an alternate route for the escape of coronary venous blood from hearts subjected to acute superficial vein occlusion.

Gross and Blum[14] noted considerable dilatation and widening of existing vascular surface channels shortly after sinus occlusion.

Beck[2] states "when the sinus is ligated blood must escape from the heart by other routes. It seeps through the various channels in the heart and escapes into the four chambers of the heart." He has found that, after ligation of the coronary sinus, the superficial veins of the right ventricle usually but not always increase in number and enlarge in size.

Roberts and Spencer[25] found by dye injection that Thebesian channels can serve as accessory mechanisms either for drainage or nourishment of the myocardium depending upon the gradient of pressure between the myocardial vascular bed and the ventricular cavity.

CORONARY SINUS AND CORONARY ARTERY LIGATION

A great deal of experimental work on this subject has been done in an endeavor to determine whether venous occlusion protects the heart against simultaneous or delayed occlusion of a coronary artery.

Gross, Blum and Silverman[7, 8, 14] found that in the majority of dogs preliminary coronary sinus ligation prevented infarction following acute occlusion of the left anterior descending coronary artery and materially reduced the size of the infarct in others. The site of ligation of the artery was two cm. below the aortic ostium.

Ungerleider, Kerkhof and Fahr,[12] using Starling's heart-lung preparation, found that raising the pressure in the coronary veins to 24 cm. of blood led to the opening up of collateral circulation in the area supplied by the circumflex artery and that, at least sometimes, ligation of this artery did not produce infarction

Beck and Mako found that the infarcts obtained after vein and artery ligation were the same as those produced in control experiments.

Lorber and Greenberg[26] studied a small series of dogs over a long period in which they had produced varying degrees of coronary sinus occlusion. They found no augmentation of the arterial bed when compared with controls. They concluded that coronary sinus occlusion was of no value in permanently increasing the vascular bed.

Gregg and Dewald[13, 18] studied the problem by physiological methods. They found that acute occlusion of the coronary sinus did not aid the coronary circulation because the myocardial area involved failed to contract in the same length of time as it did in the hearts in which the artery alone was occluded.

Robertson[17] prepared a series of dog hearts by coronary sinus ligation and then subjected them to coronary artery ligation. "They did not appear to gain adequate nutrition via the dilated Thebesian-like vessels, for, when vascular adhesions that had formed during the experiments were separated, the hearts failed through lack of blood supply."

THE EFFECT OF ACUTE VENOUS STASIS IN MUSCLE

Brooks,[27] in a series of experiments on isolated muscles in animals, established the following facts:

1. Ligature of the artery supplying a muscle produces atrophy of the muscle, but such atrophy is not accompanied by a massive formation of fibrous tissue.
2. Ligature of the artery and vein together produces results which are essentially similar to those following ligature of the artery alone.
3. Ligature of the vein draining blood from the muscle alone, leaving the arterial supply untouched, results in a remarkable series of changes culminating in death of muscle fibres and a massive fibrous tissue replacement of the whole muscle.

Middleton[22] confirmed in full the observations of Brooks. He ligated the entire venous return from the sartorius muscle leaving the arterial supply intact. The veins became turgid and the muscle cyanotic. The muscles were then examined at intervals. Two days after the production of acute venous stasis the muscles were enlarged, soft and dark blue-black in color. Microscopically the muscle fibres were separated by edematous fluid in which large numbers of polymorphonuclear leucocytes could be seen. The fibres were undergoing degeneration.

One week later the picture was the same except that more leucocytes were present. Two weeks after ligation there was commencing fibrosis. Eight weeks later the muscle was a solid mass of fibrous tissue. Intermingled with the fibrous tissue there could be seen remnants of more or less atrophic and irregular muscle fibres.

Middleton concluded that the edema resulting from acute venous obstruction in the presence of a free arterial supply is the essential factor in the production of the fibrosis.

PERSONAL EXPERIENCE WITH CORONARY SINUS OCCLUSION

The immediate effect of complete acute coronary sinus obstruction described by previous investigators has been confirmed. When the acute occlusion is placed to the right of the entrance of the middle cardiac vein, the usual phenomena of venous stasis of the left ventricle are produced. The intensity of the congestive phenomena vary greatly and it has been found impossible to predict the effect prior to the placement of the occluding ligature. When the acute occlusion is placed to the left of the entrance of the middle cardiac vein the congestive phenomena occur with less frequency. In many instances left ventricular venous stasis is not grossly apparent. Again it has not been possible to predict the effect prior to the occlusion. In general the congestive phenomena decrease as the site of the sinus obstruction moves to the left. Ligation of the great cardiac vein practically never results in grossly apparent congestion of the left ventricle.

When coronary sinus occlusion produces immediate ventricular congestion as evidenced by markedly distended veins, cyanosis of the entire left ventricle and the adjacent part of the right ventricle, subepicardial hemorrhage and bradycardia myocardial damage will usually occur. When the lesion is sufficiently severe death occurs usually within the first four days. Gross examination of the heart reveals ecchymosis in the same distribution as was the cyanosis. The blood extravasation extends for a variable distance into the left ventricular muscle and completely through the involved part of the right ventricle.

Histologic sections show free blood in the subepicardial fat and occasionally rupture of large veins. The blood extends through the entire ventricular wall but is less toward the endocardial surface. The veins and capillaries are enlarged. This is the most severe form of left ventricular ecchymosis. The majority of dogs with acute sinus occlusion do not die but in many instances the hearts go through a lesser degree of ecchymosis.

Hearts have been examined at intervals after sinus obstruction varying from one hour to four months. The gross and microscopic findings have presented a picture which varies only in the intensity of the changes. The early (hours to days) lesion consists of scattered subepicardial blood extravasations around the coronary sinus and left ventricular veins associated with venous engorgement. There is a greater or lesser degree of blood extravasation in the outer half of the ventricular wall. This decreases from without in. The right ventricle adjacent to the interventricular grooves is usually more affected than is the left. The next stage (days to weeks) consists of scattered or confluent areas of muscle cell degeneration and early fibrosis. This lesion is also more pronounced in the subepicardium and outer layers of the ventricle.

Frequently there are areas of round and polymorphonuclear cell infiltration. The myocardial cells become swollen and look not unlike Bundle of His cells. Others lose their striations and resemble young connective tissue cells. These areas of degeneration can easily be spotted under the low power. The sinus wall grossly appears thickened. Microscopically this thickening is found to be due to edema, and is not due to hypertrophy of the intima or media. There is usually a thrombus at the ligature site. The veins of both ventricles are dilated but not hypertrophied.

Frequently whorls of veins are seen over the pulmonary conus and artery and occasionally at the cardiac apex.

The final stage (weeks to months) consists of scattered areas of subepicardial and outer myocardial fibrosis. The veins are moderately to markedly dilated with many obvious anastamoses between those contributing to the coronary sinus and those emptying directly into the right atrium. There is often considerable blood pigment in the vein walls. Occasionally there is thickening of the walls of the coronary sinus and the left ventricular veins.

The variation in intensity of effect of acute sinus occlusion on the ventricle apparently depends upon the available alternate routes of venous return and rate at which these anastomotic channels can dilate. When such anastomoses are insufficient acute venous stasis develops and the condition is not unlike that described by Brooks[27] and Middleton.[22] The histologic findings in the hearts are similar in a lesser degree to those described in skeletal muscle by these authors. It is felt, therefore, that acute complete sinus occlusion in a normal dog heart only occasionally causes death; it frequently causes a varying degree of myocardial necrosis and fibrosis.

Because of the deleterious effect of acute complete sinus occlusion other methods of producing obstruction were investigated. In a series of 20 dogs an acute severe partial sinus occlusion was produced by means of encircling the sinus termination with pure polythene tubing having an inside diameter of three mm. One heart presented the immediate cyanosis usually associated with complete sinus occlusion. This animal was sacrificed 11 days later. Complete occlusion of the sinus was confirmed. There was surface necrosis and round cell infiltration in the ventricle.

The remaining animals were sacrificed at times varying from seven to 40 days. The coronary sinus obstruction was incomplete in all. The blade of a mosquito forceps could be passed through the stenosis. Four hearts showed dilated veins but no evidence of ecchymosis, necrosis or fibrosis; 15 hearts showed evidence of ecchymosis, necrosis and fibrosis. These hearts were damaged by incomplete sinus occlusion. In none of these hearts were the phenomena of cyanosis, bradycardia, etc., noted at the time of operation.

PERSONAL EXPERIENCE WITH CORONARY SINUS PLUS CORONARY ARTERY OCCLUSION

During the course of many experiments attempting to reverse the circulation in the cardiac veins the opportunity appeared of observing the effect of coronary artery and coronary sinus obstruction. One of the main complications of a systemic artery-coronary sinus anastomosis is obstruction at the stoma by a thrombus in various stages of organization.[4] The resulting state is one of coronary sinus occlusion. Either an immediate or a delayed occlusion of the anterior descending branch of the left coronary artery completes the combination. The ventricular fibrillation rate and the size of the infarct does not seem to be different from that experienced with occlusion of the artery alone. There is no doubt that "existing vascular channels" are dilated by coronary sinus occlusion but these channels are probably venous and do not appear to enhance the capillary arterial flow.

ARTERIALIZATION OF THE CARDIAC VEINS

Over 50 years ago Pratt[28] suggested the possibility of nutrition of the heart by means of reversal of the flow in the cardiac veins. His experiment consisted of forcing defibrinated arterial blood into the coronary sinus of a freshly extirpated cat's heart. Both ventricles contracted in a coordinated and regular manner at intermittent periods for one and one-half hours; they were facilitated by frequent renewals of the blood.

Roberts, Browne and Roberts,[3] using dogs with hearts in situ, created an arteriovenous anastamosis between a systemic artery and the coronary sinus by means of a glass cannula. The cardiac veins became distended, pulsatile and arterial in color. When they felt that reversal of flow was occurring coronary arterial ligation was done. The hearts continued to beat regularly and forcefully for periods ranging from 10 minutes to 26 hours. Chicago blue dye injected into the sinus resulted in a complete injection of the capillaries. They suggested that an ischemic myocardium may be revascularized by anastomosis of a large artery with the coronary sinus.

Beck and co-workers[1,2] using dogs, delivered arterial blood to the coronary sinus via the carotid artery and via a graft from the thoracic aorta They felt the anastomosis to be beneficial, the measure of benefit being gauged by the size of infarcts produced by occlusion of the left anterior descending coronary artery

Stenstrom[4] reported a series of experiments on dogs in which a systemic artery coronary sinus anastomosis was effected In a few infarction was absent after coronary artery ligation A reduction of the ventricular fibrillation rate was noted

Blalock[5,6] has done a number of similar anastomoses on dogs He feels that while very occasionally reversal of flow may occur with vascularization of the capillaries the great majority die if the stoma remains open He stresses the complications of the procedure

Beck and co-workers[1] reported approximately 700 operations on 350 dogs The operations consisted of systemic artery coronary sinus anastomosis In must instances the anastamosis was into the obstructed sinus The condition created was in effect, acute complete occlusion of the coronary sinus plus the addition of arterial blood They concluded that the degree of benefit was marked in that it was possible to ligate the descending ramus of the left coronary artery at its origin in one step with no immediate mortality and with little or no destruction of heart muscle They feel that left ventricular ecchymosis consequent upon complete sinus occlusion plus arterialization is due to malnutrition and disease in the dogs and that in healthy dogs the coronary sinus and its tributaries can tolerate arterial pressure

Blalock and Johns[5,6] described 52 experiments Twenty eight were end to end Over one half (16) died within 72 hours with the characteristic autopsy findings of patent stoma plus severe ventricular ecchymosis Twelve dogs survived longer than 72 hours the stoma was occluded in 10 and in five dogs the arterial blood was still running into the right atrium Backward perfusion occurred in one dog on account of sinus ostium occlusion Blalock thus obtained three examples of reversal of circulation in the left ventricle In these three cases the coronary sinus and cardiac veins became arterialized with marked thickening and dilatation

Stenstrom[4] reported 356 operations on 240 dogs The operations consisted of anastomosis between a systemic artery and the coronary sinus plus coronary artery ligation He concluded that occasionally arterial blood could be delivered to the myocardial capillary bed through the veins The frequency of acute left ventricular hemorrhage and anastomotic occlusion was stressed

FURTHER EXPERIENCE WITH ARTERIALIZATION OF THE CARDIAC VEINS

Since the last report[4] an additional 152 operations on 118 dogs have been done The operative mortality in this series was 33 per cent

Operative Death	40
Cardiac vein hemorrhage	16
Carotid artery hemorrhage	2
Rupture coronary artery	3
Ventricular fibrillation not associated with coronary artery ligation	8
Operative destruction of sinus	2
Anastamotic hemorrhage	5
Ligation coronary sinus	2
Left atrium rupture	2

In this series as well as in the last[4] the most frequent cause of operative death is cardiac vein hemorrhage due to injury to the deep wall of the sinus The tear is produced during the dissection necessary to isolate a section of sinus preparatory to anastomosis

END TO END ANASTOMOSIS SURVIVING OPERATION 11

Patent Stoma 5

Dog #215—died 30 hours—no ecchymosis—heart normal—cause of death not determined
Dog #218—died 12 hours—ecchymosis
Dog #223—died 16 hours—intense ecchymosis
Dog #297—died 10 hours—hemothorax (anticoagulant) — extensive subepicardial ecchymosis

Occluded Stoma 6

Dog #214—died seven days of empyema—left ventricular muscle cell d [illegible] atic

Dog #216—died 23 days of ventricular fibrillation on ligation anterior descending artery—thickened epicardium with necrotic areas.

Dog #219—sacrificed six weeks — scattered patches of fibrosis and necrosis in left ventricle.

Dog #221—died 20 hours—subepicardial and superficial myocardial ecctymosis.

Dog #222—died eight days—very extensive confluent areas of necrosis and fibrosis in left ventricle.

Dog #224—died 16 hours—ecchymosis.

There were five instances of end-to-end carotid artery—coronary sinus anastomoses which survived operation in which autopsy proved patency of the stoma. All dogs died within 30 hours. Four out of five showed ventricular ecchymosis.

There were six instances of end-to-end carotid artery coronary sinus anastomoses which survived operation in which autopsy proved occlusion of the stoma. The duration of stomal patency is not known. Three out of the six died within eight days as a direct result of arterialization or complete coronary sinus occlusion or a combination of both. The other three died or were sacrificed within six weeks and all showed lesions in the ventricle.

This series suggests that acute reversal of circulation in a dog heart with normal coronary arteries is productive of ventricular ecchymosis, necrosis and fibrosis in most instances.

SIMULTANEOUS END-TO-END ANASTAMOSIS AND CORONARY ARTERY LIGATION

Patent Stoma in All:

Dog #240—died of ventricular fibrillation after ligation both left coronary arteries —ventricular ecchymosis.

Dog #284—died of ventricular fibrillation after ligation main left coronary artery—subepicardial ecchymosis.

Dog #239—died of ventricular fibrillation after ligation main left coronary artery.

Dog #290—died of ventricular fibrillation after ligation main left coronary artery.

Dog #291—ligation anterior descending artery—veins on anterior aspect left ventricle blue; veins on posterior aspect left ventricle near anastomosis became red; circumflex artery ligated; immediate ventricular fibrillation. There was some subepicardial ecchymosis.

Dog #294—anastomosis—heart observed for one hour. A blue-red ebb and flow noted in posterior and middle cardiac veins near anastomosis; ligation anterior descending artery; veins remained blue except near stoma. Ventricular fibrillation in 10 minutes. There was dilatation of veins and subepicardial ecchymosis.

Dog #296—ligation circumflex artery one hour after anastomosis—ventricular fibrillation.

Dog #320—anastomosis then ligation main left coronary artery. Ventricular fibrillation.

Dog #303—same as #302.

Dog #305—same as #302.

Dog #310—same as #302.

Dog #311—same as #302.

There were twelve instances of end-to-end carotid artery-coronary sinus anastomosis with simultaneous left coronary artery ligation. Autopsy proved stomal patency in each instance. Arterial blood could be seen in the ventricular veins near the anastomosis but not remote from it. The impression is gained that the pressures in the carotid artery and the closed cardiac venous system are nearly equal and while carotid artery blood can be seen entering the sinus and proximal veins—the red blood is not seen in the remote veins. When the coronary artery is ligated to reduce the pressure in the sinus—the heart fails before the carotid artery blood can perfuse the capillary bed.

END-TO-SIDE ANASTAMOSIS SURVIVING OPERATION 23

Patent Stoma 15:

Dog #229—died 16 hours—characteristic intense subepicardial ecchymosis; epicardium and endocardium lifted off muscle; left ventricle slightly congested; right ventricle waterlogged with blood. The coronary sinus between the anastamosis and right atrium partially occluded.

Dog #251—died 16 hours of hemothorax (heparin)—heart normal.

Dog #264—died four days of hemothorax (heparin and dicumarol)—heart normal.

Dog #267—died seven days of hemothorax (dicumarol)

Dog #270—died four days of hemothorax (dicumarol) sinus occluded between stoma and right atrium Left ventricular ecchymosis

Dog #271—died four days of hemothorax (dicumarol), sinus occluded between stoma and right atrium In effect this is end to end anastomosis

Dog #279—died 18 days of ventricular fibrillation after ligation main left coronary artery Carotid blood was obviously flowing into the right atrium—heart normal

Dog #283—12 days after anastamosis main left coronary artery ligated Within 30 seconds, great cardiac vein became red, ventricular fibrillation two minutes later Stoma widely patent both ways

Dog #285—died 10 hours of hemothorax (heparin)—heart normal

Dog #298—died 24 hours of hemothorax (heparin)—heart normal

Dog #300—died 12 hours of hemothorax (heparin)—heart normal

Dog #313—died 10 hours of hemothorax (heparin)—heart normal

Dog #315—seven days after anastomosis the heart was observed The carotid artery flow was entirely toward the right atrium Attempted obstruction of the sinus termination resulted in rupture The torn sinus bled bright red blood Stoma well endothelialized—heart normal

Dog #318—died three days of hemothorax (dicumarol), minor subepicardial ecchymosis along left ventricular veins

Dog #319—died 12 hours of hemothorax (heparin)—heart normal

Occluded Stoma 8

Dog #226—died 10 days of ventricular fibrillation after ligation anterior descending artery—heart normal

Dog #265—died four days of hemothorax (dicumarol)—heart normal

Dog #274—died 16 days of ventricular fibrillation after ligation of main left coronary artery—heart normal

Dog #275—died 18 days of ventricular fibrillation after ligation of anterior descending artery, stoma and sinus completely occluded by scar, coronary sinus edematous Heart normal with some enlargement of veins

Dog #277—sacrificed three weeks—heart normal

Dog #278—died 30 days of ventricular fibrillation after ligation of main left coronary artery—heart normal

Dog #281—died 30 days of ventricular fibrillation after ligation circumflex artery—heart normal

Dog #304—Sacrificed 12 days—heart normal

There were 15 instances of end to side anastomosis between the carotid artery and the open sinus (i e, open into the right atrium) in which autopsy proved stomal patency In one instance there was inadvertent partial operative occlusion of the sinus between the anastomosis and the right atrium This dog died of ventricular ecchymosis despite the fact that the sinus occlusion was incomplete In two instances the sinus was completely occluded between the stoma and the right atrium These two hearts showed ventricular ecchymosis In 11 instances death occurred between 10 hours and seven days of anticoagulant hemorrhage In all nine cases nine in which the stoma was patent both ways—the heart was observed 18 days after anastomosis Carotid artery blood was obviously flowing into the sinus and directly into the right atrium Ligation of the main left coronary artery caused immediate ventricular fibrillation The heart was normal

In another instance 12 days after anastomosis the heart was observed Carotid artery blood was flowing into the sinus and atrium The main left coronary artery was ligated Within 30 seconds the great cardiac vein became red Ventricular fibrillation occurred two minutes later The stoma was patent both ways In this case it was felt that ligation of the coronary artery reduced the pressure in the sinus and cardiac veins and the carotid artery flow was reserved

In another instance the heart was observed one week after anastomosis The coronary sinus was thickened and pulsatile to the right of the anastomosis and normal appearing to the left The sinus to the right was cut and red spurting bleeding occurred The sinus to the left was then cut and normal sinus bleeding occurred The stomas was well endothelialized The heart was normal

There were eight instances of end-to-side anastomosis in which autopsy showed the stoma occluded. The hearts were normal. In one instance the stoma became occluded despite the fact that the animal died of anticoagulant hemorrhage.

From this series the impression is gained that the sinus can be arterialized without damage to the heart in the early postoperative period if the added arterial blood is directed into the atrium. The impression that acute reversal is detrimental is strengthened.

COMPLETE CORONARY SINUS OCCLUSION SURVIVING OPERATION

Operation 17:

The problem of accomplishing arterialization in two stages was studied; the first stage consisted of complete acute coronary sinus occlusion and the second stage consisted of anastomosis of the carotid artery to the previously occluded sinus.

Dog #230—ligation coronary sinus; seven days later attempted isolation of sinus resulted in death; Coronary sinus edematous.

Dog #231—ligation coronary sinus; eight days later poor end-to-side because of thickness and stiffness of coronary sinus; sacrificed seven weeks later; stoma occluded; scattered areas of degeneration throughout left ventricle.

Dog #232—ligation coronary sinus; eight days later unable to identify sinus in markedly thickened A.-V-sulcus. Sacrificed. The sinus is edematous; extensive patches of degeneration all through the muscle of the left ventricle.

Dog #233—ligation coronary sinus; died 24 hours—characteristic ecchymosis.

Dog #234—ligation coronary sinus; died 48 hours—characteristic ecchymosis.

Dog #236—ligation coronary sinus; four days later—end-to-end anastomosis; anterior descending artery ligated; one month later sacrificed—minimal infarct at apex. Stoma occluded.

Dog #237 ligation coronary sinus; sacrificed seven days later; coronary sinus edema; some thickening of intima; left ventricular veins dilated; degeneration of myocardium beneath epicardium.

Dog #238—ligation coronary sinus; died six days later of empyema; superficial left ventricular veins dilated with extravasation of blood in myocardium; extensive areas of muscle degeneration.

Dog #241—ligation coronary sinus; 18 days later identification of sinus difficult because of thickening and adhesion; attempted end-to-end caused death from sinus hemorrhage.

Dog #243—ligation coronary sinus; eight days later attempted dissection of edematous sinus caused hemorrhage and death; left ventricular veins dilated. Clear zone of muscle cell degeneration beneath epicardium; right ventricular veins much dilated.

Dog #244—ligation coronary sinus; eight days later end-to-end was accomplished with difficulty; anterior descending artery ligated; six days later died of distemper. Occlusion of stoma; great cardiac vein much dilated; outer half left ventricle contains dilated veins—gross apical infarct.

Dog #245—ligation coronary sinus; 12 days later end-to-side easily done; ventricular fibrillation on opening anastomosis; residual subepicardial hemorrhage.

Dog #246—ligation coronary sinus; seven days later—sinus so stiff and swollen it could not be dissected. Died of hemorrhage; left ventricle showed numerous areas of muscle degeneration; superficial and deep veins dilated; blood accumulation under epicardium.

Dog #247—ligation coronary sinus; 11 days later very difficult end-to-end as sinus buried in thickened tissue. Seven days later died of ventricular fibrillation after ligation anterior descending artery—stoma occluded; both ventricles normal.

Dog #248—ligation coronary sinus; dicumarol; *five days later died after dose of* nembutal; has had dicumarol for three days; thrombus at site of ligature. Outer third left ventricle heavily degenerated, also patches in deeper parts; right ventricle—extensive degeneration.

Dog #249—ligation coronary sinus; dicumarol; four days later death from hemorrhage from injury to edematous sinus Left ventricle—scattered patches of muscle degeneration beneath epicardium with blood dammed against epicardium Right ventricle—some areas of early degeneration

Dog #250—ligation coronary sinus, dicumarol, seven days later died of hemothorax (dicumarol)—Left ventricle—definite degeneration in muscle beneath epicardium but deeper parts normal—right ventricle normal

There were 17 instances of ligation and division of the termination of the coronary sinus in which autopsy confirmed its complete obstruction In two instances death resulted within 48 hours from ventricular ecchymosis In four instances the venticles showed no evidence of lesion In only one instance was the coronary sinus easy to identify and anastomose

Death occurred in nine at the second operation The cause of death was hemorrhage from attempted manipulation of the sinus Anastomosis was completed in four instances with survival Later autopsy showed stomal occlusion in all The length of time of stomal patency is not known

Dog #236 is interesting in this regard At the time of anastamosis to the obstructed sinus the anterior descending artery was ligated at its origin Autopsy one month later revealed a much small apical infarct than could be expected from arterial ligation alone The stoma was occluded Did the anastamosis remain open long enough to serve as a stop gap? On the other hand the same conditions seem to prevail in Dog #244 and yet there was a typical gross apical infarct

From this series the impression is strengthened that complete coronary sinus obstruction frequently causes congestion, degeneration and necrosis of myocardium It suggests that preliminary sinus ligation causes edema and distortion of the sinus and peri sinus tissue and makes subsequent anastomosis extremely difficult Actual sinus thickening in the immediate postligation period has not been demonstrated histologically

PARTIAL OCCLUSION OF THE CORONARY SINUS SURVIVING OPERATION 9

Partial severe occlusion of the coronary sinus was produced in an effort to prepare the cardiac veins for the increased pressure consequent upon arterialization The stenosis was produced by encircling the end of the sinus with a section of pure polythene tubing having an inside diameter of three mm

Dog #253—partial ligation coronary sinus, four days later end to end anastomosis death from hemorrhage due to friability of sinus Severe stenosis of sinus ostium—heart normal

Dog #256—partial ligation coronary sinus, sacrificed 10 days later, sinus completely occluded, edema of sinus, early superficial myocardial necrosis with round cell infiltration, had distemper

Dog #257—partial ligation coronary sinus sacrificed seven days later, severe stenosis sinus edematous, ventricles grossly normal, microscopically—superficial left ventricular degeneration, right ventricle—considerable muscle degeneration

Dog #258—partial ligation coronary sinus, sacrificed one week later, severe stenosis, grossly the sinus wall was greatly thickened this was due to edema—both ventricles normal

Dog #259—partial ligation coronary sinus sacrificed seven days later, severe stenosis grossly the sinus wall was greatly thickened, microscopically the sinus is thin walled, endothelium is normal Blood pigment in intima beneath the endothelium muscle layer beneath intima is edematous left ventricle surface veins distended, superficial muscle degenerated, in deeper myocardium—areas of extravasted blood and areas of degeneration—right ventricle normal

Dog #260—partial ligation coronary sinus, seven days later attempted end to end, great difficulty in exposing sinus which was markedly contracted, lumen very small, anastomosis abandoned on account of friability, sacrificed—severe stenosis—Left ventricle subepicardial hemorrhage and marked degeneration of outer third of myocardium—right ventricle normal

Dog #261—partial occlusion of coronary sinus 11 days later attempted dissection of end of sinus futile on account of swelling and friability; sacrificed—severe stenosis. Sinus wall distended by edema—left ventricle—extensive degeneration of muscle beneath epicardium with scattered deeper areas —right ventricle normal.

Dog #262—partial occlusion of coronary sinus; 12 days later extreme difficulty in isolating sinus for anastomosis; a poor end-to-end accomplished. Death in one hour from anastomotic hemorrhage — heart normal — complete sinus occlusion.

Dog #263—partial occlusion of coronary sinus —sacrificed during attempted anastomosis—severe stenosis; peri-sinus edema. Apart from dilated veins both ventricles normal.

In seven instances severe incomplete coronary sinus obstruction was produced and confirmed at later autopsy. In three instances no ventricular lesion was produced. In four cases mild to moderate superficial myocardial degeneration was noted. In all instances sinus and peri-sinus edema was produced. From this series the impression is gained that even incomplete sinus obstruction sometimes produces myocardial degeneration and usually produces sinus edema making anastamosis difficult.

GRADUAL ARTERIALIZATION OF THE CARDIAC VEINS

It is felt that acute reversal of circulation in the cardiac veins only rarely is possible. For this reason an effort is being made at the present time to arterialize the cardiac veins chronically. At the same time it is attempted to occlude the left coronary artery. During a one stage procedure an end-to-end anastamosis is effected and the origin of the left coronary artery and termination of the coronary sinus are encircled with plasticized polythene film[29] (1.5 mil polythene film containing less than one percent dicetyl phosphate). It is anticipated that fibrosis will produce gradual obstruction of the encircled regions. No impression has yet been gained.

COMMENT

Coronary sinus obstruction appears to be necessary in order to reverse the circulation in the left ventricle While such obstruction carries a low mortality rate, the venous stasis produced causes myocardial lesions in a great number of hearts. The conditions produced are not unlike those described by Brooks and Middleton in their experiments on the effect of acute venous stasis in skeletal muscle. It is not known whether the same myocardial effects would be produced with acute sinus occlusion in a heart with a chronically deficient arterial supply, as the above remarks have reference to the dog heart with a presumably normal coronary artery inflow.

The systolic intrasinus pressures immediately after acute occlusion approach or equal the systolic pressure of the carotid artery thus mitigating against arterial backflow. This has been observed repeatedly at the time of anastomosis to the closed sinus. The red blood can be seen and veins adjacent to the actual anastomosis and not remotely.

The contention that in healthy, well-nourished dogs the heart is unaffected by sinus ligation and arterialization has neither been confirmed nor denied. The impression is gained, however, that these effects can be produced in well-nourished apparently healthy dogs.

The contention of Blalock that if the stoma remains open into the closed sinus most dogs die has been confirmed.

It is felt that reversal of the circulation in a normal dog heart can be accomplished only rarely, as an acute experiment.

If it is to be done with any hope of frequent success, the reversal must be gradual. This impression is also held by Shaner[30] who has studied all the specimens histologically. Again it is stressed that these remarks have reference only to the normal dog heart. Acute reversal has not yet been attempted in the heart with a chronically deficient coronary inflow. At the present time experiments are in progress in which gradual reversal plus gradual coronary artery occlusion are being attempted.

A stage which appears necessary in the process of gradual reversal consists in the creation of a temporary arterio-sinus-right atrium fistula. A number of such fistulae have been produced and the patency confirmed at subsequent operation and autopsy. Gross and histologic study of the hearts revealed no evidence of lesion. The long term effect of such a fistula has not yet been studied at autopsy. At the present time there are four animals at the three-month period in which it is felt that the anastomoses are patent. Clinically the animals are well. In an animal with such a fistula (Dog #283) spontaneous reversal occurred after ligation of the main left coronary artery. This, however, did not prevent ventricular fibrillation.

With regard to prevention or reduction of infarction, the previous reports of Beck[2] and Stenstrom[4] have neither been confirmed nor denied as in no instance in *this* series was reversal effected satisfactorily.

In one animal in this series a left persistent superior vena cava was encountered. This was divided where it pierced the pericardium and an easy end-to-end anastomosis performed.

The left coronary artery and the termination of the coronary sinus were encircled with plasticized polythene film. Two weeks after operation observation of the end of the sinus showed it to be pulsatile and to contain red blood. At that time an arterio-sinus-right atrium fistula was present. The animal has not yet been sacrificed.

It has been suggested[2] that preliminary sinus ligation makes subsequent anastomosis easier. This has not been confirmed. On the contrary, in our experience, after ligation the sinus becomes edematous to such a degree that isolation and anastomosis is rendered extremely difficult and hazardous.

The frequency of anastomotic thrombosis has led to the use of the anticoagulants with mixed results. In this series a frequent cause of death has been hemothorax.

SUMMARY

Previous investigation on coronary sinus obstruction and arterialization has been summarized. In addition 152 operations on 118 dogs have been done, which consisted of partial and complete coronary sinus occlusion, anastomoses between the carotic artery and the open and closed sinus plus coronary artery ligation.

1. Coronary sinus occlusion in the normal dog heart frequently produces hemorrhage, degeneration and necrosis in the myocardium.
2. Acute arterialization of the closed coronary sinus with reversal of circulation with survival has not been produced.
3. Simultaneous arterialization of the closed sinus plus ligation of the main left coronary artery has not been successful in preventing immediate death.
4. An arterio-sinus-right atrium fistula has been produced a number of times. Such a fistula is apparently without early ill effect.
5. Gradual reversal of circulation in the cardiac veins may be productive of more success.

RIASSUNTO

Dopo avere riassunto i risultati di precedenti ricerche sperimentali sopra l'ostruzione del sono coronario e successiva arterializzazione, l'A. riporta altre 152 operazioni eseguite sopra 118 cani. Le operazioni sono consistite nell'occlusione parziale o totale del seno coronario: nella formazione di anastomosi fra l'arteria carotidea ed il seno aperto od accluso: nella legatura delle arterie coronarie.

Ecco le conclusioni tratte da questa nuova serie di operazioni:

1. L'occlusione del seno coronario produce frequentemente nel cane emorragie, degenerazione e necrosi del miocardio.
2. Non e' stato possibile ottenere mediante un'arterializzazione acuta del seno coronario occluso, con inversione della circolazione, una sopravvivenza degli animali.
3. Anche la legatura dell'arteria coronaria principale di sinistra, contemporanea ad un'arterializzazione del seno occluso, non ha prevenuto una morte immediata.
4. Una fistola arteriosa del diritto atriumo destro e' stata frequentemente ottenuta, senza effetti dannosi.
5. Un'inversione graduale della circolazione nelle vene cardiache potrebbe forse condurre a risultati migliori.

SUMARIO

El autor presenta un sumario de la obstruccion del seno coronario con arterialization. Se han practicado 152 operaciones en 118 perros. Estas operaciones han consistido en la oclusion parcial o completa del seno coronario, con anastomosis de la arteria carotida

comun y dicho seno y al mismo tiempo ligacion de la arteria coronaria.

1. La oclusion del seno coronario en el perro produce frecuentemente hemorragia, degeneracion y necrosis del miocardio.

2. No se ha podido producir la arterializacion aguda del seno coronario ocluido con reversimiento de la circulacion y sobrevivencia del animal.

3. La arterializacion simultanea del seno coronario ocluido mas la ligacion de la arteria coronaria izquierda no ha evitado la muerte inmediata del animal.

4. La fistula arterio-seno con el atrio derecho se produjo varias veces. Esta fistula aparentemente no dio resultados graves.

5. El reversimiento gradual de la circulacion en las venas cardiacas pueda que mejores resultados.

SOMMAIRE

L'auteur résume les recherches antérieures sur l'obstruction du sinus coronaire et sur l'artérialisation. Sur 152 operations pratiquées sur 118 chiens, ou fit de l'occlusion partielle ou complète du sinus coronaire, et l'anastomose de l'artère carotide et du sinus ouvert ou fermé et en plus la ligature de l'artère coronaire.

1. L'occlusion du sinus coronaire chez un chien possèdant un coeur normal, produit souvent l'hemorragie, la dégéneration et la nécrose du myocarde.

2. L'artérialisation aiguë du sinus coronaire fermé avec renversement de la circulation n'a pas été suivie de survivance du chien opéré.

3. L'artérialisation simultanée du sinus fermé accompagnée de la ligature de la principale artère coronnaire gauche produit la mort immediate.

4. Une fistule artériosinusatrium a été obtenue dans un nombre de cas. Cette fistule ne produit apparemment aucune suites nocives

5. Le renversement graduel de la circulation dans les veines cardiaques, peut être productif de plus de succès.

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Tumors of the Testicle—Relationship of Structure to Course and Prognosis

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THIS paper is based on a detailed study of 41 cases of testicular tumor. Most of them have been under observation for four or more years unless death supervened. In nearly every case the care of the patient was a personal one, the pathological material was studied carefully and repeatedly and the end result accurately recorded. Even though only three to six years have elapsed since treatment and though the number of cases is small, it is felt that we have learned something of value regarding the relationships of structure to treatment and prognosis

R. A. Willis[1] writes:

> "Because malignant teratomas and seminomas do not differ greatly in their prognosis and treatment, clinicians found little disadvantage in this confusion of the two groups."

Surely he has not conveyed the meaning intended, for both the first and second statements are incorrect. It is the purpose of this paper to suggest how much can be deduced from a study of the pathological material; it is not a survey of the whole subject so little reference is made to the literature on these tumors. From the standpoint of pure pathology, this paper adds nothing to previous knowledge, but the following points will be stressed:

1. The outlook for seminoma viewed over a five year period, is many times better than for teratoma.
2. For a tumor to be labeled a seminoma it must have the characteristic, uniform appearance described for such a tumor. Unicellular tumors exist showing much greater cell variation and differing in general pattern from seminomas. They are not seminomas. They are resistant to irradiation and are highly malignant. We do not use the term "embryonal carcinoma"—it infers more than can be proven.
3. Some of the most malignant of testicular tumors are included among the teratomas. In other parts of the body they would be called adenocarcinomas. They are called teratomas on presumptive evidence only. They are hemorrhagic. They frequently contain syncytial masses which signify rapidity of growth and not necessarily the presence of chorionepithelioma.
4. Hormonal tests are unreliable diagnostic aids.

At the end of the paper, the problems of trauma and maldescent, and the number of cases resembling acute inflammatory lesions will be discussed.

SEMINOMAS

Out of the total of 41 cases, 17 had the appearance said to be typical of seminomas

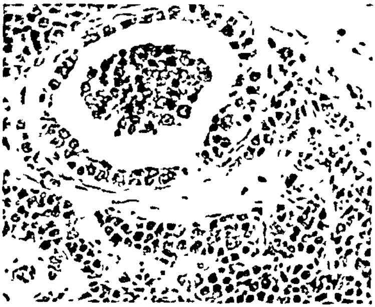

Fig. 1. Seminoma X 200.

Histology: These tumors are characterized by the uniform appearance of the cells, which are large with clear cytoplasm and a nucleus which varies in appearance according to the method of preparation (Fig. 1). The chromatin material may be reticular or particulate. Connective tissue may be scanty and areolar or mature in the form of collagenous bands with small round cells in abundance. The cell bears a superficial resemblance to a spermatocyte but this is rather a mature cell to be forming a tumor. The Sertoli cell is more primitive and basic and is more likely to give rise to tumors. but it is hard to recognize them in the absence of spermatids.

In completely undescended testicles and in testicular tissue atrophied from trauma or pressure, the tubules are lined by a single layer of cells. It is hard to be dogmatic as to the nature of these cells. They bear just as close a resemblance to the cells of seminomas as do spermatocytes. They are probably Sertoli cells but they lack the high lipoid content of the cytoplasm which, during spermiogenesis, Sertoli cells gain. most likely, from the cytoplasm of the spermatids. However, such speculations do not get us far. The tubular origin is frequently suggested (Fig. 1).

Slightly different is the seminoma occurring in some older men. McGovern, Department of Pathology, Sydney university, has shown sections of eight seminomas in men 50 or more years of age (their ages were 50, 54, 54, 59, 60, 69, 70 and 77 years). It was interesting to note that the cell differs somewhat in appearance from that usually described, for it is small (Fig. 2). A round, uniformly stained nucleus is surrounded by an acidophile cytoplasm smaller in amount relative to the nucleus than is usually found in seminomas. The origin from seminiferous epithelium may also be suggested (Fig. 3). All specimens received similar treatment so that any difference is not due to artefact.

In the University series similar growths have also been found in younger men.

Clinical Features: In this series most seminomas occurred between the ages of 30 and 40 and none over 50 years old; four patients were under 30. Prognosis does not appear to have been altered by age. Five had frank metastases.

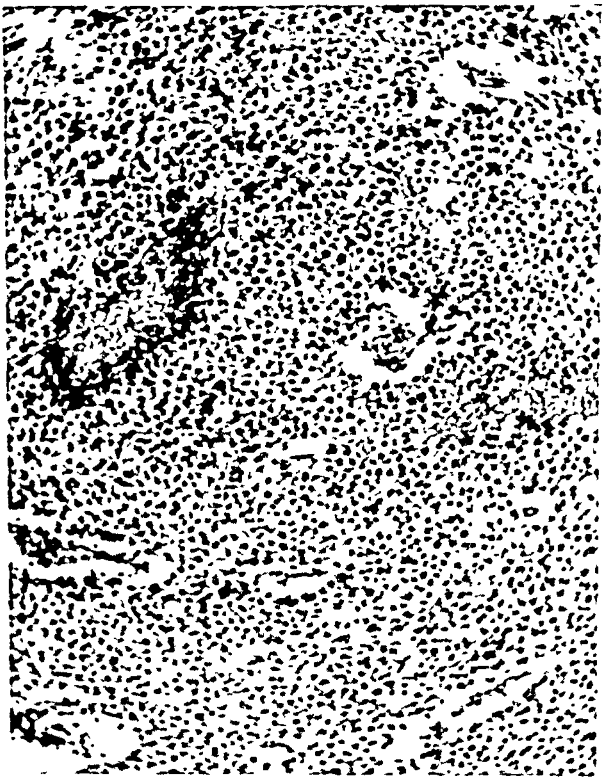

Fig. 2. Small cell seminoma X 100.

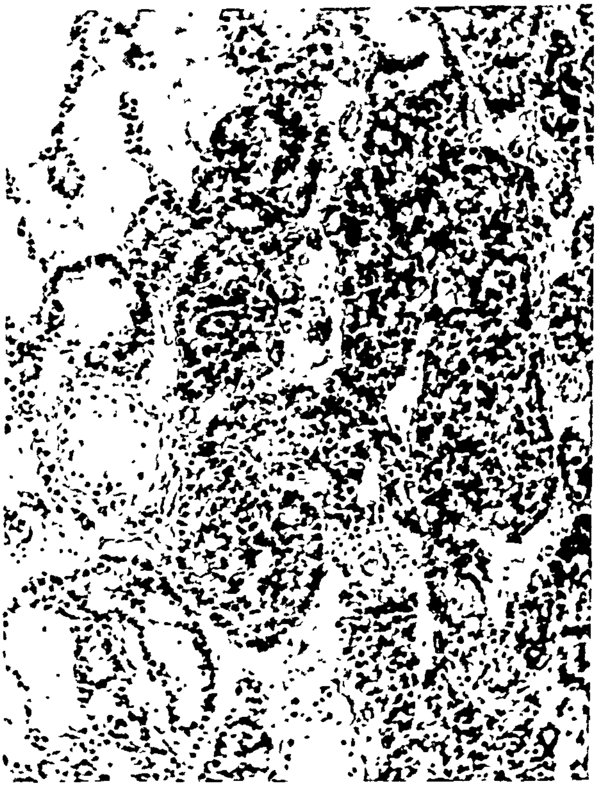

Fig. 3. Seminoma X 100.

Four tumors had been present for one month or less and one for two days only Since all cases have done well we cannot evaluate the importance of the length of history nor strangely enough the presence or absence of metastases although the latter must surely influence prognosis They have all been radio sensitive

The five cases with metastases all of whom are well are worthy of further consideration One which will be referred to again when the question of imperfect descent is discussed was a case of seminoma in an abdominal testicle It was the only instance of involvement of the inguinal glands It is four years since operation and irradiation and six years since the appearance of the primary tumor

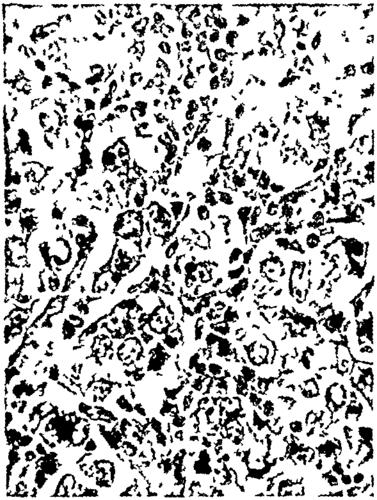

Fig 4 Malignant unicellular tumor X 200

The second patient presented an enormous abdominal tumor a seminoma in an abdominal testicle with aortic glandular involvement He is alive four years after the onset of his illness

The third man gravely ill was admitted to the hospital with what appeared clinically and radiologically to be pneumonia When it appeared that he would shortly die despite treatment of his pneumonia the possible part played by a testicular tumor (previously thought to be incidental) was discussed The testicle was removed under local anesthesia It proved to be a seminoma Irradiation was instituted Improvement was immediate and the patient is still well and working normally as a laborer three years after operation As the lung cleared two secondaries could be seen which had possibly caused atelectasis

The fourth patient had what appeared to be a seminoma This was irradiated and not excised The tumor disappeared Subsequently mediastinal and cervical glandular metastases have occurred and have been irradiated effectively He still is well five and a half years since the tumor was irradiated, although the Aschheim Zondek test was positive three years ago

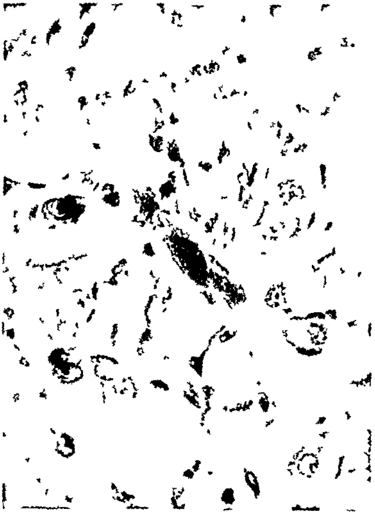

Fig 5 Rhabdomyosarcoma X 200

The fifth of these cases had a peculiar and unusual history. He was admitted to the hospital after a short illness with what appeared to be obstruction of the inferior vena cava, fever, abdominal pain and bilateral obstruction to the venous return from the legs which were swollen, painful and tender.

Examinations and many investigations failed to show a cause. Anticoagulant therapy, among other forms of treatment, failed to effect any improvement which could not be accounted for by the rest in bed. The only finding from the investigations was a four-year-old history of syphilis and a persistently positive Wassermann reaction.

Appropriate treatment was instituted. The physician noted that one testicle was *smaller* than the other and had apparently been injured three years previously. The Aschheim-Zondek test was negative. Although the swelling of the legs had partly subsided, abdominal pain with intermittent fever persisted for nine months. The smaller testicle was excised. It contained three small seminomas. The abdomen and mediastinum were irradiated. Symptoms subsided rapidly. It is difficult not to believe that the tumors in the smaller testicle were accompanied by abdominal metastases, but this may be wishful thinking.

Hormones: Many of these cases were treated while on active service with the Australian Army, and investigation of urinary hormones was not performed in all cases. Of those in which tests were carried out, 50 percent had demonstrable follicle stimulating hormone in the urine; the other half gave negative tests. We do not place much reliance on this investigation as a diagnostic aid in seminomas.

Since the presence of this hormone in the urine appears to be a castration effect, it should not be characteristic only of tumors. One wonders why it does not occur more frequently in other conditions. Indeed we needlessly removed the testicle of a 30-year-old man because of its size and the presence of a positive Aschheim-Zondek test. The testicular swelling was a large gumma.

ANAPLASTIC UNICELLULAR TUMOR

Many pathologists include these among the seminomas or what they term embryonal carcinomas. We are not interested so much in the pathological controversy but in the personal experience that such tumors (Fig. 4) are radioresistant, highly malignant and followed by death in a few months.

Histology: It is regrettable that there is lack of uniformity in the use of various terms. Assuming that seminomas are carcinomas of seminiferous epithelium, what is their relationship to these highly malignant tumors whose life history is so different? Extensive investigation of such growths in this series has failed to reveal any other type of tissue, that is, they are unicellular, although exhibiting much cellular variability. They are carcinomas of the testicle but from what cells, it is useless to guess. Because teratomas occur frequently in the testicle it has been assumed, often without much justification, that unicellular testicular tumors are a special form of teratoma. This may be what Willis[3] (p. 555) calls "cellular undifferentiated teratomatous epithelium".

The cells are "epithelial" in general appearance. They give no suggestion of having come from more than one germ layer. They form

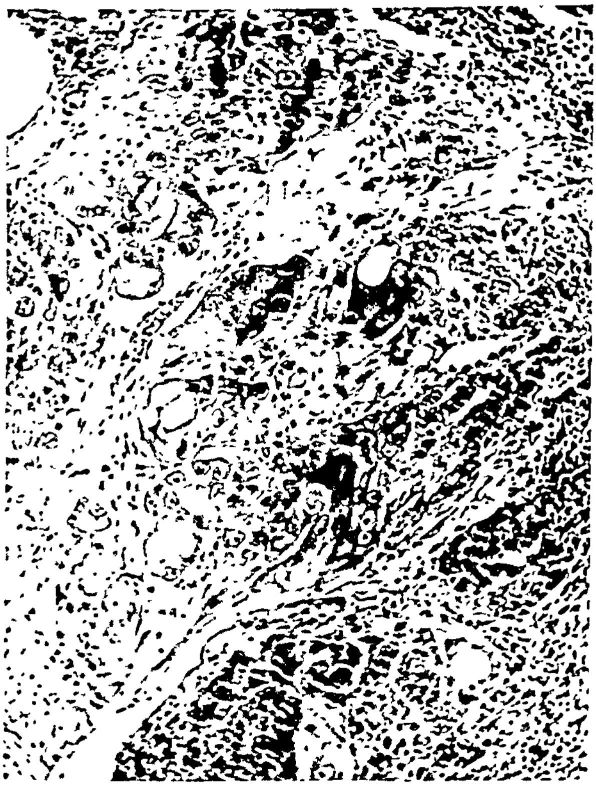

Fig. 6. Lung metastasis from teratoma X 100.

no composite structure nor surround spaces. The connective tissue is poorly developed, immature but not obviously malignant. Blood vessels are abundant The structure of a seminoma may be approximated (Fig. 6) but it is frequently quite unlike these tumors though unicellular (Fig. 4).

Clinical Features: Five of our cases were placed together in this group. The youngest was 25 and the oldest one was 33 years old In two cases the tumor had been present for a year; in three cases the tumor had been found six months or less before operation. In no case was a luteinizing hormone found in the urine In three cases the urine contained a follicularizing hormone. In one case the Aschheim Zondek test was negative. In the fifth case no such test was performed.

The two patients with the longest history of tumor (12 months) lived the longest—15 and 18 months after operation The other three survived for six months or less, that is, all five perished in 18 months or less after operation In this group, structure is closely related to prognosis

In no case were the metastases in the slightest degree improved by irradiation In only one of the five cases of seminoma with metastases described in the previous section, were there demonstrable pulmonary secondaries, whereas, in this group of more malignant tumors, metastatic deposits in the lungs occurred invariably.

It seems that lymphatic spread is usual with seminomas, the blood stream being far less often invaded. The converse would appear to hold for all other types

TERATOMAS

Multicellular tumors differ from seminomas, not only in structure, but in their poor prognosis. I have not seen any improvement occur in teratomatous metastases following irradiation. It is doubtful whether such treatment is of any use as an adjunct to excision. It is usually done in order "to leave no stone unturned". Prognosis is occasionally quite erroneous. The patients are slightly younger as a group than those with seminoma.

Two main structural sub groups occurred: (1) tumors showing clearly the derivatives of more than one germ layer; and (2), what may be called hemorrhagic adenocarcinomas. In addition, one case occurred where the entire tumor appeared to be mesodermal in origin and consisted of spindle cell sarcoma or rhabdomyosarcoma.

1. Of the first group there were 12 cases. The urine contained follicle-stimulating hormone in all cases tested and in 50 percent, luteinizing hormone Four cases have died. They perished within 12 months of operation but the tumor had been present up to five years before death. The six surviving cases had operations four to six years ago. A positive Aschheim-Zondek test was received from two patients at some time since operation but not recently.

On looking back over the sections, I cannot correlate structure with prognosis, nor was there a constant relationship between urinary hormone concentration and prognosis High concentrations indicated usually a poor outlook but important exceptions occurred.

The case of sarcoma (Fig 5) occurred in a man of unstated age The testicular tumor was felt the day following a kick in the testicle while playing football. It was not found on the day of injury. The Aschheim-Zondek test was negative. The patient died seven and a half months after the discovery of the tumor. There were widespread secondaries No autopsy was performed.

It often is quite impossible to be sure that more than one germ layer is or is not represented in a tumor. Often opinions as to the origin of cells result from absolute guesswork. For example, columnar cells enclosing a space may come from endoderm or neuroectoderm. Columnar ciliated epithelium may arise from the endoderm of the respiratory tract or the genital mesoderm. The endoderm of the gullet may be columnar or stratified squamous depending on the apparent age of the embryonic tissue. The early indifferentiated cells of the paraxial mesoderm are quite "epithelial" in appearance. Such considerations make interpretation difficult enough apart from the absence of that association between different tissues, which enable us to recognize any particular organ.

2. The cases grouped as hemorrhagic adenocarcinomas have these features in common: (1), a microscopic appearance sug-

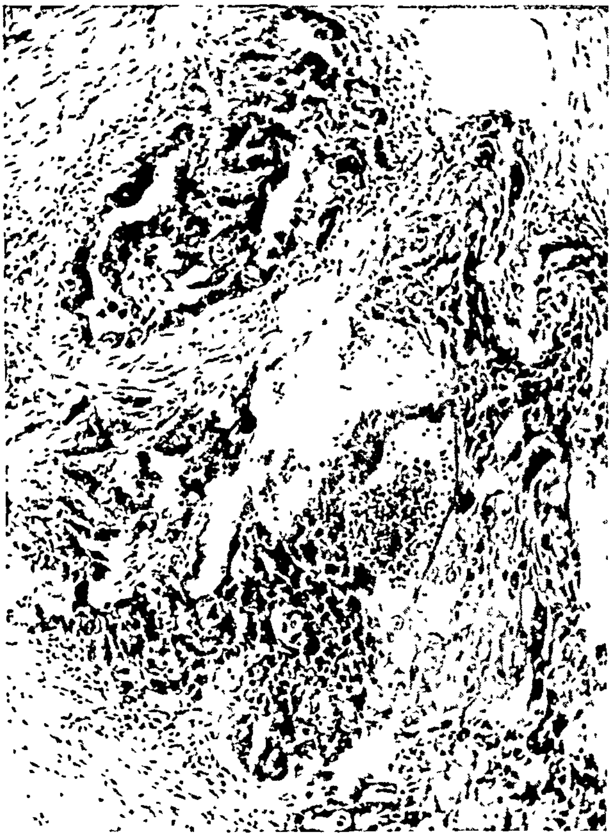

Fig. 7. Hemorrhagic adenocarcinoma X 100.

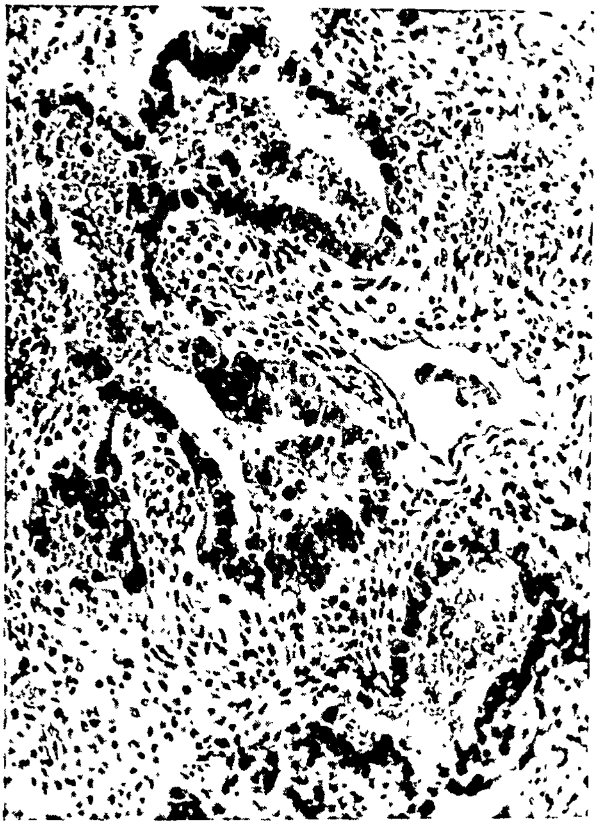

Fig. 8. Pulmonary metastasis from testicular tumor of chorionepitheliomatous appearance.

gesting, at a glance, a very malignant tumor and (2), an almost invariably gloomy prognosis. Seven tumors fell into this category. Among them were three which, either in the primary tumor or in the metastases, exhibited the structure usually described as chorionepithelioma.

It would seem, in these three cases, that this appearance was indicative of rapidity of growth rather than of a particular type of tumor. Close searching revealed the presence of an adenocarcinomatous structure somewhere in the tumor. It might be suggested that the tissue referred to is truly chorionepithelioma, being but one manifestation of the pluripotential nature of the tumor.

Fig 6 depicts a pulmonary metastasis from a testicular tumor which had been removed three years before. The original lesion was a teratoma, consisting mainly of spaces lined by a fairly regular columnar epithelium and showing no great evidence of special malignancy. Three years later the patient was admitted to the hospital with multiple lung secondaries. Urinary gonadotropins were present in the urine in a concentration of more than 5000 mouse units per litre. At autopsy, tumor tissue was found in the para-aortic region and in the lungs but not elsewhere. The para-aortic tissue had a structure similar to the original tumor. The metastases in the lung were quite different. They were very vascular and had the appearance of chorionepithelioma.

Fig. 7 illustrates a section of the primary testicular tumor of a man, age 24. A lump had been present for nine months. Follicularizing and luteinizing hormones were present in the urine but their concentration was not determined. The patient died three months after operation and irradiation. There were widespread metastases in the para-aortic glands, lungs and liver. The pulmonary secondaries (Fig. 8) have the structure of a very malignant tumor but not a chorionepithelioma.

In the third case (Fig. 9) some areas of a very anaplastic testicular tumor are not unlike chorionepithelioma. The tumor had been present for two months before operation and irradiation. Urinary gonadotropins were estimated at more than 3000 mouse units per litre. The patient is well and apparently free from metastases two years after treatment. The Aschheim-Zondek test is negative.

Apart from the features described in the above three cases, the finding of a tumor, consisting mainly or wholly of hemorrhagic adenocarcinomatous material points to a grave prognosis. Fig. 10 shows such a growth where there is some effort at the formation of spaces lined by columnar epithelium. The disordered connective tissue and the hemorrhagic nature of the tumor are obvious. The blood may lie in the spaces lined by the tumor cells (as in this case) or may be extravasated in the loose connective tissue. The tumor cells may be grouped around ill-formed blood vessels from such a tumor as seen in the pulmonary metastasis (Fig. 11). In this latter case the primary tumor and the secondaries in the lung were very vascular but all the other metastases were not.

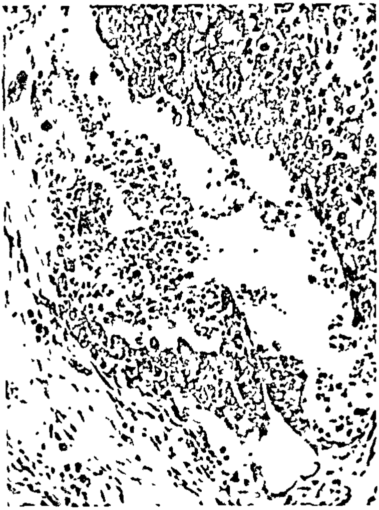

Fig 9. Hemorrhagic testicular tumor.

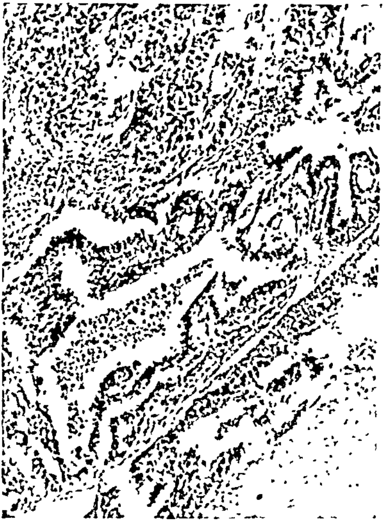

Fig. 10. Hemorrhagic testicular tumor.

This patient died from a transverse lesion of the lumbar cord due to invasion of the cord by tumor cells The metastasis was apparently blood-borne, affecting the meninges and spreading into the cord along a posterior nerve root. According to Mitchiner,[2] seminomas give rise frequently to secondary deposits in the nervous system. This is the only case in this series where a testicular tumor of any sort affected the central nervous system, nor can I find many cases recorded in the vast literature.

Only one of these seven cases is alive. Four of the rest died within a year. The other two patients died one and a half and three years after operation. The expectation of life was occasionally unpredictable from examination of the histology although a grave prognosis

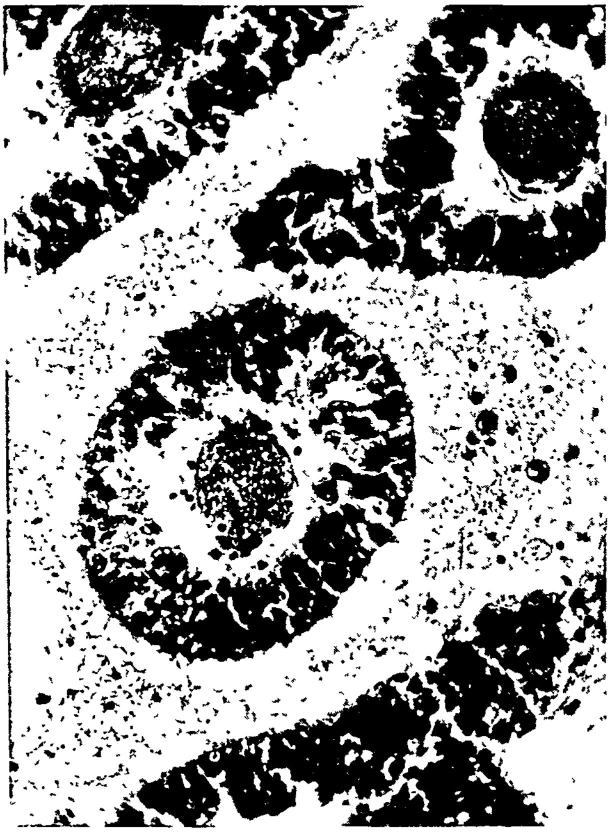

Fig. 11. Pulmonary metastasis from primary growth seen in Fig. 10.

must be given always in such cases. Only rarely will exceptions occur.

TESTICULAR TUMOR ASSOCIATED WITH IMPERFECT DESCENT

Of the 17 seminomas, two occurred in testicles retained within the abdomen. One of these cases has been recorded previously (2 Wyndham-1945). The other 15 tumors in this category were found in normally situated viscera.

Two of the 14 teratomas occurred in testicles situated in the groin or internal inguinal ring. One of the seven adenocarcinomas was found in the groin.

Thus five of 41 cases occurred in maldescended testicles. This is about the usual finding. The prognosis in this small series did not seem to be affected. The structure of the tumor appeared to be the determining factor.

TESTICULAR TUMOR AND INJURY

It is hard to imagine that any injury could produce a palpable tumor within a few days. But it is hasty judgment to assume, as is usually done, that the attention of the patient was directed to the tumor because of the injury. Five of the patients in this series gave a clear history of trauma as the initiating incident of their illness. In three of these, the testicle was examined immediately after the injury and found to appear normal. The tumor became manifest in periods ranging from two days to three weeks. There is not the slightest evidence that the injury was the actual cause of the tumor. It is just as hard to deny that it had anything to do with the revealing of an occult tumor.

A CAUSE OF ERROR IN DIAGNOSIS

Eight cases were first treated as inflammatory lesions. They exhibited tenderness and swelling and, in four instances, appeared to respond favorably to sulphonamide therapy. This error was made mostly with the seminomas. But it did happen in the case of one hemorrhagic tumor. Since excision is the only useful form of treatment in such growths, the need for care in the observation of all cases of epididymorchitis, during and after treatment, is obvious.[1]

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Chronic Ulcerative Colitis*

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INTRODUCTION

IN 1928, I presented a report at the Annual Meeting of the Canadian Medical Association held at Charlottetown, Prince Edward Island, on the subject of this infectious disease of which the specific microorganism had not yet been definitely isolated[1] Certain observations, made over a five year period by Dr Fred Cadham and myself, suggested that at least some of these cases represented a chronic form of bacillary dysentery In 1929, a further report described the isolation of dysentery organisms in five out of nine cases of ulcerative colitis[2]

This thesis seemed reasonable because two of the patients had had colitis dating from an attack of bacillary dysentery in the Far East, and because the proctoscopic picture in many patients resembled that reported in cases of so called chronic bacillary dysentery Furthermore, the idea was attractive because it implied the possibility of controlling the disease by the use of suitable vaccines or immune sera Indeed, several workers had already reported favorable results in the treatment of colitis by such agents The insistent and enthusiastic search for a successful therapy, along bacteriological lines, is understandable when one recalls the generally unsatisfactory nature of both medical and surgical approaches to ulcerative colitis at that time

Now, 20 years later, again on an island but this time on the opposite Coast, I am privileged to present to you my views on this problem and to indicate, modifications that have taken place in the intervening two decades

ETIOLOGY

Unfortunately, the pathogenesis of ulcerative colitis is even more obscure than appeared to be the case twenty years ago Organisms which seemed to be specific causal agents are now regarded as important only in the sense of being actual, or potential, secondary invaders Bargen's[3] diplococcus has been isolated in too many normal controls, and competent bacteriologists elsewhere have failed to detect it in a significant number of colitis cases Similarly, the incrimination of bacterium necrophorum has not been sustained

The possible relationship of the dysentery organisms, however, has been more difficult to determine No one can deny that they may have been present in the initial attack of a case of colitis Stool culture is seldom carried out promptly and it is well known that in epidemics of bacillary dysentery these bacilli frequently disappear from the feces in a day or two In the recurrences of ulcerative colitis there has been ample opportunity to secure early stool examination, and it must be admitted that this, on the whole has not yielded pathogenic organisms sufficiently frequently to be of significance in etiology

The apparent efficacy of the sulphonamides in controlling symptoms in certain acute exacerbations of the disease has suggested that relapse in some instances may be due to supervening intestinal infection It should be pointed out that these drugs are seldom used as the sole therapeutic measure and that, in diseases characterized by cycles of relapse and remission, it is particularly difficult to tell whether the patient gets better because of the treatment used or because he was about to do so anyway

Bacteriologically, then, we are back to the viewpoint of Sir Humphrey Rolleston,[4] who in 1923 stated his belief that this disease was not due to any specific organism but rather that various bacteria could invade tissues when there was sufficient decline in the resistance of the host Indeed, it is in this field that much clinical interest has grown in recent years—in the host's defense against infection, in his nutrition and even in his psyche[5] There has been a tendency in some quarters to re

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*A Founders Lecture (No 3) delivered at the Annual Meeting of the North Pacific Surgical Association Victoria British Columbia Nov 21 1947

Division of Surgery Winnipeg Clinic Winnipeg Canada gard ulcerative colitis as the expression of certain biological susceptibilities, either inborn or acquired. *It is an inflammatory reaction of the colon to a variety of factors—infective, allergic, nutritional, and neurogenic.* In a surgical paper, these can be discussed in only the briefest manner.

Allergy is believed by some to be a primary factor in colitis but it has rarely been possible to alter the course of the disease by the removal of suspected foods from the dietary. In several patients, there has been a transient inability to take milk or certain fruit juices, but the return of tolerance during remission makes one ask if the sensitivity is not a result rather than the cause of the disease. Similarly, *malnutrition* would seem to be a complication giving rise to some of the outstanding features in the clinical picture, rather than a causative factor. Most difficult of all to evaluate, however, are the *psychological features* in ulcerative colitis and it is about these that much of the discussion of recent years has centered.

Surely there is no illness that can be more discouraging to a patient than a recurring diarrhoea, with an anal sphincter constantly on guard, often accompanied by pain, fever and the many complications that go with the full-blown case of ulcerative colitis. Loss of self-confidence and emotional depression are understandable consequences of such a train of symptoms.

Harder to accept is the thesis that ulcerative colitis may develop from a disorder in *colon function* arising primarily from the maladjustment of a susceptible personality to environmental stress. Nevertheless, there are some clinicians who believe that patients in this group tend to exhibit certain personality characteristics. They are said to have a low reserve of energy and tend to be docile or overly passive in their acceptance of the inevitable in life. Whether one accepts this viewpoint or not, it seems clear that in such individuals, at least, exacerbation in ulcerative colitis seems to follow an inability on the part of the patient to meet a distressing situation in his life. Whenever this is the case it has implications of the greatest importance in prognosis and treatment.

Whatever may be the outcome of this speculation as to pathogenesis of ulcerative colitis, the bulk of experimental and clinical research supports the conception that there is a multiplicity of precipitating factors. In animals, the syndrome of exaggerated muscle contraction, edema, vascular engorgement and bleeding, may be produced by as varied stimuli as the parenteral injection of either acetylcholine or Shiga bacillus toxin, or the induction of the state of shock, or the electrical stimulation of the sacral autonomic nervous system. The answer to the problem in human colitis will come only by our making a comprehensive study of each case and submitting the accumulated data to further critical analysis.

CLASSIFICATION OF CHRONIC NON-SPECIFIC ULCERATIVE COLITIS

It is customary to subdivide this disease into its lesser clinical entities. The lesion pursues different patterns in different individuals. These variations depend to some degree upon the anatomical extent of the disease as it affects the large bowel. Thus, chronic ulcerative colitis may be regarded as being *diffuse* or *segmental* in its distribution. The brunt of the disease is usually borne by the rectum and lower sigmoid but in the diffuse form the whole colon may be involved. In such instances, the process may even extend into the terminal ileum. Where the lesion is limited to the rectum or the rectum and sigmoid, the greater part of the colon may continue to function. Thus fecal material is deprived of its fluid content and becomes formed before it reaches the affected area. The patient, in such cases, may pass only one or a few normal stools daily yet have discharges of blood, mucus and pus frequently. Indeed, I have encountered patients who, apart from such discharges, have been constipated. On the other hand, when the bowel has lost its absorptive ability because of the large portion involved, the stool remains liquid and this state is contributed to by discharge from the ulcerative lesions and bleeding. In such cases the diarrhoea is severe.

The differences in the clinical pattern depend also upon the ability of the patient to tolerate his infection once it is established. It is probably in the onset of the disease that the greatest variations are observed It is not unusual for this chronic protracted condition to herald its onset with *an acute and sometimes fulminating attack* In such a form, the patient becomes severely ill within a short time There is a high fever and abdominal pain Twenty or more liquid stools, often very bloody, may be passed in a day As a result, *dehydration and anemia, followed soon by* severe nutritional disturbances, greatly reduce the patient's chances to survive If he recovers, it may be because of the nature of the disease with its spontaneous remissions and because of supportive treatment Following this, recovery may be complete as occasionally happens But further acute attacks may follow with mild, chronic manifestations during the intervals

I have seen a number of cases develop in the opposite manner Thus, *the onset has been insidious* with the patient having little to complain about except an increasing diarrhoea and perhaps a low grade fever There may be four to eight stools a day A moderate anemia may be present which fails to respond to treatment Such cases may continue in this mild but definite form for long intervals without remission Often for some cause, there may be an abrupt acute relapse with all evidence of the disease magnified

These different clinical pictures may be accepted as evidence that the disease is a variable one and that the stage in which it first manifests itself depends upon certain factors which are, at the present time, not completely understood

DIAGNOSIS

Chronic ulcerative colitis may be diagnosed on the basis of both negative and positive findings In this country, endamoeba histolytica occurring as it does in five percent of the population, is encountered or suspected quite often so that it must be ruled out It is capable of producing symptoms and findings similar to those met with in non specific colitis Thus careful stool examinations are warranted in all cases where the presence of amoebae is possible Often failure to discover amoebae is insufficient to eliminate them as the causative organism In such cases, a course of emetine hydrochloride as a therapeutic test may be indicated Ordinarily, apart from the symptoms of ulcerative colitis already noted, the diagnosis depends chiefly upon the proctoscopic and roentgenological findings

In the chronic form of ulcerative colitis the rectal mucosa is uniformly involved, thickened, granular and hyperemic The vascular network, which is so obvious in normal mucosa, is lost *The congested mucosa is easily* traumatized and bleeds freely Actually, ulceration may not be observed in this stage, although in the acute relapses the picture is often one of destruction Much of the lining of the rectum has become necrotic and sheds off to form ulcers which vary in size and coalesce to form extensive raw areas A word of warning against too vigorous instrumentation is indicated. at this point It must be remembered that the diseased wall of the bowel can be easily perforated by too great force during the examination In the acute or sub acute phase, I limit the examination to the rectum alone when obvious proctitis is present No preparation other than a preliminary hypodermic when patient is in hospital is provided before the examination Irritating enemas only aggravate the preexisting inflammation and produce a misleading impression

The foregoing description is not truly specific of idiopathic ulcerative colitis for it may, on occasion, be mimicked by any of the dysenteries, especially Flexner Bacillus dysentery and amoebic dysentery Cases of amoebic ulceration which I have seen in Winnipeg have been of two kinds the one in which there are typical oval or round, discrete necrotic ulcers with but slightly congested intervening mucosa and in which the diagnosis is readily proved, the other, in which the mucosa of the rectum is deeply congested and of a velvety appearance with diffuse coalescing ulcers presents a picture which is hardly distinguishable from that of idiopathic ulcerative colitis But again, smears from the ulcers or examination of the mucus from the bowel will reveal the vegetative forms or the cysts of endamoeba histolytica Further, there is almost invariably a rapid response to a daily injection of Emetine Hydrochloride (grains one half to grains one) Carcinomatous or tuberculous ulcerations which enter the diagnostic field only in so far as they occasion discharge of mucus, blood and pus from the bowel, are readily recognized on proctoscopic or sigmoidoscopic examination.

In the first stages of chronic ulcerative colitis, the roentgenological changes may be negligible. Later, as scar tissue is formed, it is noted that the colon fails to shorten on evacuation after a barium enema and the haustral markings are lost, the rugae become smooth and no mucosal pattern is visible. The walls of the colon are rigid with scar tissue and the colon, no longer distensible, has the appearance of a smooth, hollow tube.

MANAGEMENT

It has been customary to distinguish between medical and surgical treatment of ulcerative colitis. A more apt phrase would be *medical management with or without surgery.* As the years have passed, the limitations of purely medical measures in the more serious cases have been widely recognized. At the same time, more gratifying results from surgery have followed a degree of clarification of the indications for operative intervention, and standardization of the procedures used. To some extent, however, *the good results in surgery must be attributed to more faithful utilization during the preoperative and postoperative period of what might be called the basic principles of good medical management of ulcerative colitis.*

The first of these, unquestionably, is *the maintenance of optimum nutrition.* This is not usually a problem in the mild case with limited involvement of the colon. However, with the development of frequent discharges of liquid feces, with mucus, blood and pus, a state of nutritional deficiency is likely to appear. This may be manifested by weight loss, anemia, and any of the numerous signs of protein and vitamin deficiency. When high fever is added, usually with anorexia and great reduction in food intake, these losses are greatly abetted. To overcome them is sometimes the greatest problem in treatment, requiring heroic measures on the part of the doctor, nurse and dietitian, as well as the earnest cooperation of the patient.

A high caloric intake is required, usually including 200 grams of protein daily, or more, if one is to restore nitrogen equilibrium. Sometimes prolonged tube feeding is the most feasible method of providing the essential foodstuffs. Repeated transfusions are more valuable, as a rule, than the administration of iron. Vitamin K is necessary when hypoprothrombinemia and bleeding is present. The other vitamins should be provided in excess, preferably parenterally as well as *per os.*

Competing with nutrition, as the major issue in medical treatment, is the problem of psychological management of the ulcerative colitis patient. While many of my patients have shown great determination to get well, others are often discouraged, overdependent, and ready to give up when difficulties are encountered. Whether these latter features are a result of their disease, or have contributed to its development, is really less important than that they be recognized frankly and treated deliberately. This involves getting to know the patients as persons—understanding their background and sympathetically appreciating their frailties. The painstaking explanation of the *treatment plan* is often of more value than the reiteration of general reassurances. These things are more easily advised than carried out, and sometimes all of one's efforts are frustrated by the absence in the patients of the will to get well.

The place of sulphonamides and the antibiotics is still under assessment. Their value in coping with peritonitis, abscess and suppurative invasion of the intestinal wall is undoubted. Sulphathalidine and streptomycin both alter the bacterial flora in the colon but whether they can influence the natural course of the disease has yet to be established. One of my medical colleagues is making a special study of the effect of these agents in colitis, while another is endeavoring to manage his cases without their aid, relying chiefly on nutritional measures and an approach from the psychosomatic viewpoint. In several years, a comparison of their results should be informative.

We are all agreed that a seriously ill patient should receive both sulphathalidine and streptomycin, or their successors, for a period of five or six days. One must watch out for allergic sensitivity to foods and medicines and be constantly alert to the presence of coincidental disease This calls for a competent search for endamoeba histolytica in every case, as well as the culturing of stools for bacterial pathogens whenever a relapse cannot easily be explained.

SURGICAL TREATMENT

With this general review of the disease let us now address ourselves to the special problems relating to surgery in ulcerative colitis. There can be no doubt that surgery in this disease, like surgery in duodenal ulcer, hypertension and hyperthyroidism, is a stop-gap which must be employed until the deficiency in our knowledge as to cause and proper therapy has been met.

In chronic ulcerative colitis, the earlier experience with surgery has been disappointing More recently, there has been an improvement in the results for various reasons. Chief among these is the trend towards earlier operative interference. In this way, surgery is not applied to a subject who has become seriously debilitated because of malnutrition, hemorrhage and the general effects of infection and who represents, therefore, a very poor risk. Moreover, better methods are now available in the care of the ileostomy once it is established. The patient can be reassured with more confidence of his ability to reestablish himself as a useful member of society. Thus he may more willingly become a candidate for earlier ileostomy.

There is no doubt in the past that some of our patients have suffered much from a conservative attitude. Unwarranted delay in performing an ileostomy and colectomy has permitted serious remissions with loss of earning power, heavy medical expenses and even placed the patient's very life in the balance; indeed, too often, the result has been fatal. There is still no definite set of criteria to determine when surgery is indicated. If the course of the disease is marked by acute flare-up, one nurses the hope that every exacerbation will be the last. If these recurrences are severe and prolonged, it may be reasonable to state that surgery should be performed after two or three attacks. If the disease is chronic but unrelenting, perhaps a definite time period of several months should be permitted beyond which it is obvious the patient cannot recover and surgery is inevitable.

In the standard surgical treatment of ulcerative colitis there are three procedures available. These are: (1) ileostomy alone; (2) ileostomy with partial or complete colectomy; and (3) ileosigmoidostomy and partial colectomy where the rectum and lower sigmoid are not involved.

ILEOSTOMY

Ileostomy is undertaken for several reasons First, it is generally followed by marked improvement in the patient's condition. Second, by defunctionalizing the colon, the disease process may be brought to a halt and a restoration of the intestinal continuity be permitted after a satisfactory period of observation. Unfortunately, this second event does not occur often and it is unwise to hold out much hope concerning such a possibility.

In a number of patients, an ileostomy has produced dramatic symptomatic relief providing saline and fluid balance is maintained The temperature may become normal in 48 hours and stay normal after many weeks of fever. The simple and obvious explanation would be that the ulcerated colon is being constantly bathed and irritated by the fecal discharge from the ileum. This factor is surely of doubtful significance when one realizes from experience that recurrence of all the features of a fulminating colitis with fever, hemorrhage and perforation can subsequently develop in spite of the presence of the ileostomy. To speculate that one has temporarily severed an important intrinsic nerve control is at least intriguing. This may explain the dramatic, immediate, clinical improvement after ileostomy. Finally, ileostomy is a preliminary step to colectomy.

Ileostomy has now, I believe, completely replaced cecostomy and appendicostomy. These latter methods are inadequate as they fail to isolate or completely defunctionalize the colon. In the performance of ileostomy, a left lower paramedian incision is used. The ileum is transected and the distal end closed. The proximal portion is brought through the abdominal wall by means of a stab wound to the right and below the umbilicus. This method, which has been described by Dennis[5] of Minneapolis, deserves merit for two reasons.

As no suture material is used in a stab wound, there is little chance of injury to the ileum traversing it as may occur when the bowel is brought out through an incision. Again, the main incision is sufficiently far from the ileostomy that it can be protected from contamination. In the matter of selecting a site for dividing the ileum, we are influenced by the advice of Cattell[6] of the Lahey Clinic. Because of the incidence of ileitis in this condition, we select a level 18 to 24 cm. from the ileocecal valve for ileostomy.

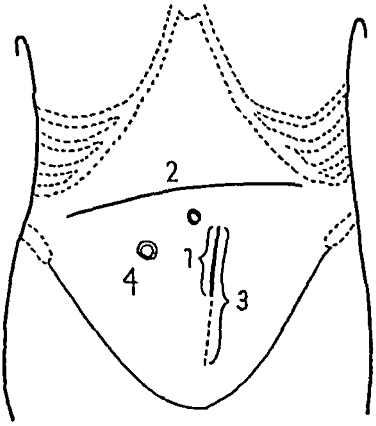
COLECTOMY

Colectomy is indicated in cases of chronic ulcerative colitis that have failed to respond to adequate medical treatment. Apart from intractability with persistent or recurrent attacks of fever and ulceration with fibrous contraction of the entire bowel, there are serious complications of stricture, severe hemorrhage, fistula in ano, recurrent arthritis, pyoderma gangrenosa, polyposis and malignancy, which justify radical removal of the diseased colon.

If total colectomy is indicated for the reasons mentioned, it is divided into two stages because of the magnitude of the procedure. Special preoperative care is indicated making free use of penicillin and blood. The passage of a Miller-Abbott tube 48 hours prior to the operation as suggested by McKittrick[7] of Boston has a distinct advantage. As it is passed, the small bowel is gathered on the tube. In this way it can be easily retracted during colectomy.

A transverse incision is made above the level of the umbilicus extending laterally sufficiently far to free the attachments of both the right and left colons. In this way, easy access is obtained to the cecum, ascending and transverse colons. It permits also mobilization of the splenic flexure and much of the descending colon. The latter is freed distally as far as possible and is divided somewhere in the sigmoid. The distal part of the sigmoid should be brought out through a small separate incision and left for the next stage. Some danger may arise if the diseased bowel is left within the abdomen with a blind loop. Conceivably, it might blow out due to the disease itself or because of a stricture distally preventing drainage. However, I have on two occasions inverted the bowel end and left it in the abdomen without mishap. In others, I have sewn a catheter into the sigmoid and brought the catheter out through the lower abdomen.

The final stage is the abdominoperineal removal of sigmoid and rectum. It can differ from that operation as employed in rectal cancer. Inasmuch as there is no necessity for wide removal of lymph nodes, the mesentery of the sigmoid and that of the upper rectum can be left in place. The obvious advantage thereof is that much dead space is thus eliminated.



INCISIONS FOR:

1 ILEOSTOMY.
2 PARTIAL COLECTOMY.
3 ABDOMINO-PERINEAL RESECTION.

4 PERMANENT ILEOSTOMY.

Occasionally, it will be possible to preserve the use of the rectum and the anal sphincter because of absence of proctitis. In such cases, an anastomosis of the ileum to the lower sigmoid is done as a preliminary procedure to removal of the proximal colon.

The four following cases illustrate most of the complications of ulcerative colitis requiring colectomy:

Case 1: Mrs. D. W. P., No. 13248, age 26. Case of ulcerative colitis without remission for over 18 months

This patient was first seen in July 1944, with a history of chronic diarrhoea with bleeding for the past 18 months and a weight loss from 138 to just over 80 pounds

She had been under hospital treatment elsewhere in January 1943 An orthodox medical regime had been instituted at that time but, because her symptoms were of recent origin and her home was in Western Canada, her attendants consented to her return here

When she came to the Clinic, medical treatment was continued and she was placed on sulphaguanidine, a high protein low residue high vitamin diet and was given repeated blood transfusions Notwithstanding this thorough and intensive medical treatment over a period of six weeks, her condition remained unaltered

It was decided that this patient represented a type of chronic ulcerative colitis causing continuous, intractable illness without remission, whereas the commoner type is the patient who has many remissions and exacerbations over the first few years

Proctoscopic examination revealed a contracted ulcerated rectum which bled easily Early in October 1944, an ileostomy was done with prompt relief of symptoms and her temperature immediately became normal She was discharged from the hospital at the end of November and instructed to return in six months' time

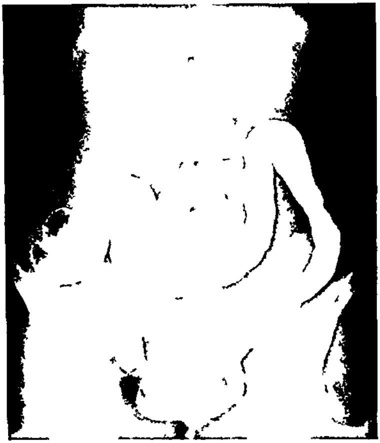


Fig 1 Case 1 Intractable ulcerative colitis with typical lead pipe colon.

However, she returned within one month because of an exacerbation of the colitis with acute pain An ileostomy does not protect a patient from exacerbations and I have observed very severe exacerbations in such patients At this time a barium enema revealed extensive chronic ulcerative colitis (Fig 1) She was again placed on intensive medical treatment The pain disappeared but she ran a slight temperature and had a more or less constant discharge from the rectum

In July 1945, the second stage operation was done by resecting the terminal ileum and the colon down to the middle of the sigmoid flexure I was unable to bring the sigmoid out because the mesosigmoid was short and the best one could do was to suture the tube in the terminal sigmoid and bring out the tube through the abdominal wall An abdominoperineal resection was performed in November of the same year to complete the operation The pathologist's report was chronic ulcerative colitis

During the ensuing three years and four months, this patient has remained well She does her own work on the farm and she now weighs 167 pounds She still has her good appetite and her good sense of humor, both of which, in my opinion, have been very important factors in her excellent recovery

Case 2 Mr N S, No 32517, age 24 Case of ulcerative colitis of seven years' duration characterized by recurrent attacks of diarrhoea and fever complicated by arthritis, pyoderma gangrenosa and irreparable damage to the colon

This patient had been hospitalized for the first time in 1940 for a period of six weeks because of diarrhoea and bleeding and loss of weight (41 pounds) Stool examinations were negative for endamoeba histolytica and sigmoidoscopic examination revealed an intensely edematous and haemorrhagic mucosa His condition had improved on discharge

He made good progress and gained 28 pounds but returned to his doctor in April 1941 with recurrent diarrhoea and cramps He spent two weeks in the hospital and again was improved on discharge In July of the same year he had an acute exacerbation of his illness was hospitalized and an ileostomy was performed He was examined again in November 1943, after two years of excellent health Later the same month, he was examined in a large clinic where the diagnosis of chronic ulcerative colitis was confirmed by sigmoidoscopic and x ray examination His sedimen

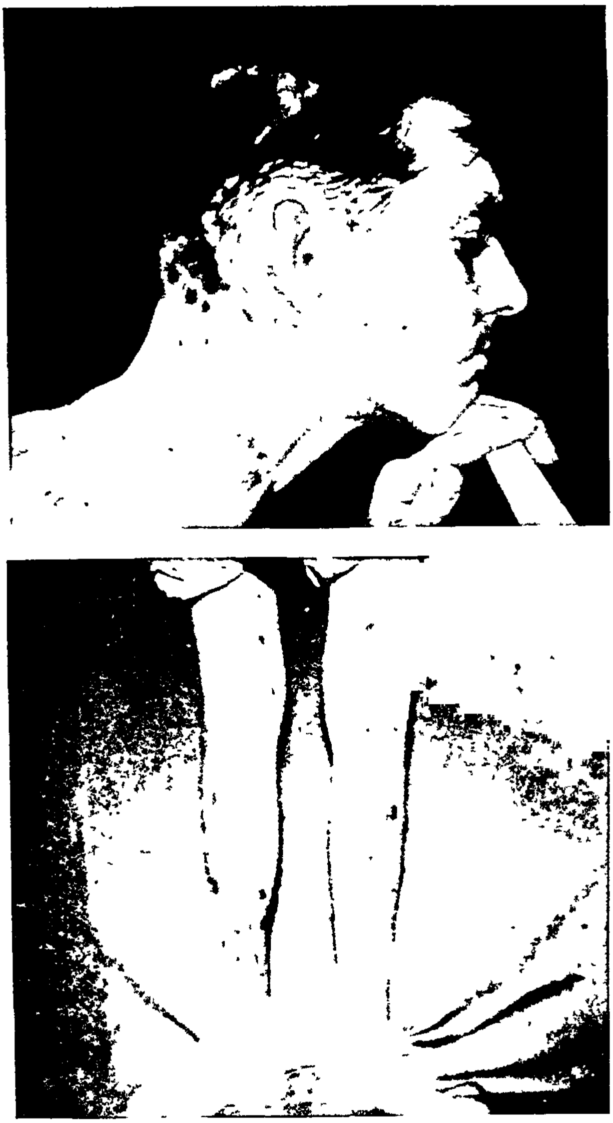


Fig. 2. Case 2. Pyoderma gangrenosa complicating diffuse ulcerative colitis.

tation rate was normal. They did not advise any further surgical interference at that time.

In June 1944, he was admitted to the hospital with periarticular swelling of one knee which subsided in a few days. In August of that year, he was again admitted to hospital for a period of six weeks because of several bouts of acute recurrent polyarthritis. In December 1944, he broke out in sores and boils all over his body and he was treated with penicillin.

By December 1946, he had recurrent pyoderma which improved with intramuscular and local penicillin. Sigmoidoscopic examination at that time revealed an ulcerated, bleeding bowel.

He was referred to me in January 1947 because of a continuous, purulent, bloody discharge from the rectum, in spite of the presence of an ileostomy. He was admitted to hospital for observation. His weight was stationary. He reported recurrent attacks of generalized arthritic pains with swelling of the left knee joint during the past year and a great many skin lesions on the face, the back of his neck, the thorax and both extremities (pyoderma gangrenosa) (Fig. 2). While these responded to penicillin therapy, streptomycin seemed to have a more pronounced effect.

On March 21, 1947, a colectomy was done with exteriorization of the distal end of the lower sigmoid. The pathologist reported that the entire colon showed extensive changes and the mucosa, for the most part, was replaced by granulation tissue. There was marked submucosal fibrosis with inflammatory infiltration of all layers. The diagnosis was diffuse, non-specific ulcerative colitis.

On June 11 of the same year an abdominoperineal resection for chronic ulceration of the rectum and lower sigmoid was done and the microscopic diagnosis was diffuse, non-specific ulcerative colitis.

Since dismissal, he has had no complaints except for recurrent ulceration of the left leg and a slight

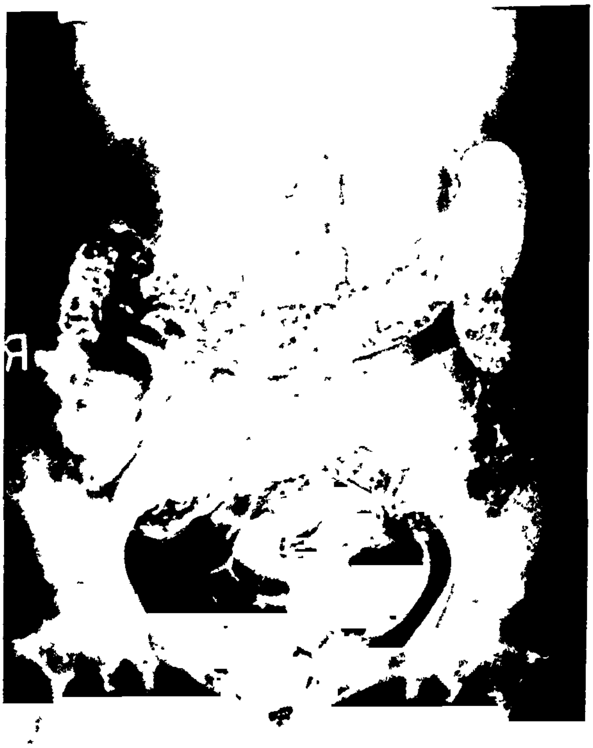


Fig. 3. Case 3. Colitis polyposa without involvement of the rectum or lower sigmoid.

ulceration on the right leg His appetite is good and he has gained weight He empties his ileostomy bag twice a day Ordinarily, the discharge is a heavy, fecal substance but if he takes a lot of fluids the discharge is more liquid

Case 3 Mrs S Z, No 37331, age 37 Case of ulcerative colitis of four years' duration with recurrent attacks, complicated by marked polyposis, but not involving the rectum and lower sigmoid

This patient reported to the Clinic in July 1947, with a history of intermittent diarrhoea and bleeding per rectum of four years' duration Her appetite was good but she had lost 15 pounds in weight during the last four months The stools (three to seven daily) were described as containing bright blood mixed with a lot of slime

The patient was pale, thin and looked older than her stated age General physical examination was entirely negative Sigmoidoscopic examination showed the mucosa of the rectum and lower sigmoid was entirely normal Laboratory examination showed hemoglobin 9 3 grams R B C 3 490,000, W B C 11,650, color index 0 88, blood Wassermann negative, and sedimentation rate 62 mm per hour The urinalysis was negative and a gastric analysis showed no free hydrochloric acid with histamine A barium enema revealed no haustral markings and multiple polypi scattered throughout the entire colon except in the lower sigmoid The diagnosis therefore, was colitis polyposa without involvement of the rectum or lower sigmoid (Fig 3)

On April 9, 1947, a low ileosigmoidostomy was performed and on October 23 of the same year a colectomy was done The pathologist's report was as follows 'the entire bowel removed shows a diffuse ulcerative process with marked polypoid overgrowth of intervening mucosa Many of the ulcers which vary in size from 0 5 to 2 5 cms in diameter, show partial or complete reepithelization" She made an uneventful recovery and has remained well since

Case 4 Mr G B G, No 9471, age 44 Case of ulcerative colitis of 12 years' duration complicated by polyposis and carcinoma

This patient presented himself in February 1940, with a history of diarrhoea with blood of five years' *duration Sigmoidoscopic examination at that time* revealed diffuse granular inflammation of the rectum and the lower sigmoid The mucosa was very vascular and several small polypi were present Intensive medical management resolved his symptoms completely In February 1943, following a severe chest cold he developed a recurrence of the diarrhoea Apart from the proctitis, he was not really ill at that time

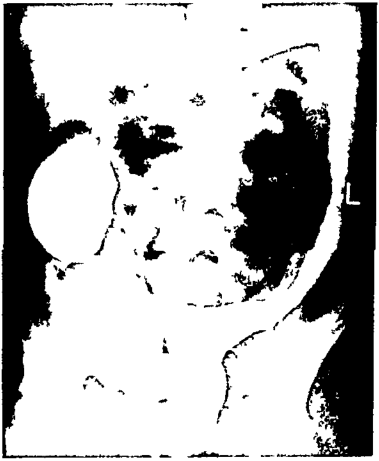


Fig 4 Case 4 Diffuse ulcerative colitis of 12 years' duration complicated by carcinoma of the rectal ampulla

A barium enema was done in January 1944 and this revealed a definite lead pipe type of colon (Fig 4)

In January 1946 Dr Harry Williams, Deer Lodge hospital Winnipeg found endamoeba histolytica in the stools Dr Wendell Macleod supervised medical treatment with emetine hydrochloride

In January 1947 a terminal ileostomy was done At the same time a small mass in the rectum was biopsied and reported to be adenocarcinoma grade two On Feb 3, 1947, an abdominoperineal resection was performed, reversing the usual order because of the new lesion in the rectum The pathologist's report was infiltrating colloid adenocarcinoma grade two, much of the tumor was growing in under the normal mucosa It was classified as Duke's 'B' with no lymph node involvement There *was also marked sub mucosal fibrosis and chronic* inflammation because of the long standing ulcerative colitis The patient made an uneventful recovery from this operation and in January 1948 he had a colectomy done

There was a feature in this case which may be of interest to those who do abdominal surgery When the abdominoperineal resection was performed the end of the sigmoid was brought out through a stab wound. This drained for four months but when I saw him in January 1948, just prior to the colectomy, there was complete healing of the abdominal wall at the colostomy and, according to the patient, this had been healed for eight months. Therefore, he had a completely closed loop between the inverted end of the ileum and the retracted end of the sigmoid. When operated on in January 1948, the colon was not dilated. There was a large bolus of inspissated material in the caecum but otherwise the large bowel was completely contracted in spite of the fact that both ends were closed. He made a very satisfactory recovery from this operation.

He states now that he is in excellent health and does all the heavy work on a farm. His appetite is good and he weighs about 200 pounds. The patient is fitted with an ordinary rubber bag which he empties three or four times a day. The discharge is a thick, fecal material of the consistency of porridge but it is apt to be more liquid if he takes a lot of fluids.

STATISTICS

Five Year Period: To March 31, 1949

Total number of patients	64
Number treated surgically	22
Types of Operations:	
(a) Ileostomy only	5
(b) Ileostomy and colectomy	15
(c) Ileosigmoidostomy and partial colectomy	2
Mortality:	
Early—Ileostomy only	3
Late —Ileostomy only (made dramatic recovery after ileostomy; gained weight, returned to work and felt well. Colectomy refused. Died 18 months later in state of acute fulminating ulcerative colitis in spite of the presence of an ileostomy.)	1
Late —Acute small bowel obstruction six months after colectomy	1

CONCLUSION

The constitutionally ill-equipped, the despondent, and the easily discouraged patient is handicapped from the very beginning and often fails to adjust himself satisfactorily to the problems arising out of his disease. On the other hand, the patient who is so *constituted* that, in spite of this dreadful affliction, he retains his appetite, his sense of humor and his will to live, *that* patient *will* survive even at the price of a total colectomy and will surmount the trials of his ileostomy. He is indeed often an asset not only to his community generally but a help to others who are likewise faced with an ileostomy life.

SUMMARY

1. Ulcerative colitis is primarily a medical problem and remains so in approximately 60 percent of cases.
2. Medical management must be comprehensive and thorough with special attention to both nutritional requirements and underlying emotional factors.
3. However, the tendency to withhold the benefits of surgery until the situation is desperate cannot be too strongly condemned.
4. A plea for *earlier* operation must not be mistaken for a plea for *early* operation.
5. Ileostomy *does not cure* ulcerative colitis. Severe exacerbations are not uncommon after ileostomy. Perforation and severe hemorrhage have occurred weeks or months after ileostomy. Cases "cured" by early ileostomy would certainly have responded to bed rest, high protein feedings and maintenance of morale.
6. Ileostomy should be considered the first step leading to colectomy. The cases in which reestablishment of the continuity of the intestinal tract can be done are exceedingly rare and, in my opinion, indicate an error in judgment regarding the necessity for ileostomy and are not an argument for *early* ileostomy.
7. Colectomy should be proceeded with as soon after ileostomy as feasible where malignancy is suspected or proven, or in the presence of polyposis or persistent free discharge of pus and blood from the bowel. Otherwise, colectomy may be postponed for six to 12 months.
8. The victims of this serious malady deserve earlier comprehensive medical management and somewhat earlier surgical intervention if chronic invalidism, high operative mortality, or even the incidence of malignancy are to be materially reduced.

9 Therapy cannot be safely divided into medical and surgical treatment. Medical treatment alone will suffice in the majority of cases For the remainder, surgery plus intensive medical therapy is necessary. Teamwork should be stressed in the total management of this disease

RIASSUNTO

1 La colite ulcerativa è e rimane un problema medico nel 60%, circa, dei casi

2 La cura medica deve essere completa ed accurata, con speciale riguardo ai problemi nutritivi ed ai fattori emozionali

3 La tendenza a procrastinare la cura chirurgica fino a che le condizioni diventano troppo gravi e' comunque deplorevole

4 Il consiglio di anticipare in taluni casi l'operazione non deve pero' significare un'operazione troppo precoce

5 L'ilestomia non cura la colite ulcerativa Esacerbazioni gravi ricorrono abbastanza frequentemente dopo quest'operazione Emorragie profuse e perforazioni intestinali possono insorgere anche dopo alcuni mesi Guarigioni ottenute mediante l'ileostomia avverrebbero egualmente con il riposo a letto, una dieta ricca di proteine ed opportuna psicoterapia

6 L'ileostomia dovrebbe essere considerata quale una prima tappa verso la colectomia L'A ritiene veramente rari i casi nei quali e' possibile un ripristino della continuita' intestinale Questi pochi casi non possono rappresentare un argomento a favore di una precoce ileostomia Nella maggioranza dei casi l'ileostomia non e' necessaria e rappresenta quindi un errore

7 *La colectomia dovrebbe seguire—appena* possibile—l'ileostomia nei soggetti sospetti o affetti da tumori maligni nei casi di poliposi o di fronte ad una persistente eliminazione intestinale di pus e di sangue Altrimenti la colectomia puo' essere ritardata da 6 a 12 settimane

8 Volendo evitare un'invalidita' permanente un'elevata mortalita' operatoria e ridurre d'altra parte la frequenza dei tumori maligni, e' bene anticipare al massimo la piu' accurata cura medica, e se questa non basta, la cura chirurgica

9 La cura della colite ulcerativa non e' ne' esclusivamente medica, ne' esclusivamente chirurgica, donde la necessita' di un'intima collaborazione fra il medico ed il chirurgo

SUMARIO

1 La colitis ulcerativa es primariamente un problema para el internista, y en un 60 por ciento de los casos no requieren otra clase de tratamiento

2 El tratamiento medico debe de ser bien planeado en todo detalle y muy especialmente en su tratamiento dietetico y de los factores emotivos de la personalidad del paciente

3 Sin embargo se condena la tendencia de recurrir a la cirujia cuando ya el paciente se encuentra en un estado critico Esta demora es inexcusable, pero esto no quiere decir que se *aconseja la de preferencia*

4 La ileostomia no es de por si curative en estas colitis Recidivas serias ocurren con alguna frecuencia despues de la ileostomia, lo mismo se puede decir de la perforacion y de las hemorragias severas que pueden aparecer haste meses depues de esta operacion En cambio casos que se reportan como curados por la ileostomia en los principios de la enfermedad, indudablemente se habrian obtenido los mismos resultados con el tratamiento conservativo de cama rigurosa, dieta proteinica elevada, psicoterapia

5 La ileostomia debe de considerarse como el primer paso a la colectomia Los casos en los cuales se puede re establecer la continuidad *del intestino son muy raros, y en mi* opinion esto indica un error de juicio y por lo tanto no es argumento de valor a favor de la ileostomia en los casos recientes

6 La colectomia debe de seguir a la ileostomia tan pronto sea posible en los casos de cancer o en los que se sospeche esta enfermedad, tambien en la poliposis, o en casos de evacuaciones purulentas o hemorragicas persistentes De lo contrario la colectomia se puede posponer de seis a 12 meses

7 Estos enfermos merecen un tratamiento comprensivo medico, y si es necesario, la intervencion quirurjica cuando esta se indique para evitar el invalidismo cronico, alta *mortalidad quirurjica y aun mismo la* incidencia del cancer

8 El tratamiento puramente medico es suficiente en la mayoria de los casos En los

otros la cirujia mas la terapeutica medica intensiva son necesarios. La cooperacion de los dos es esencial en el tratamiento de esta enfermedad.

SOMMAIRE

La colite ulcérative est:

1. Un problème médical et reste un problème médical dans approximativement 60 pour cent des cas.

2. Le traitement médical doit être très varié. Il faut donner une attention spéciale aux necéssités nutrionnelles et aussi aux facteurs émotionels.

3. Neánmoins quand la situation est grâve, il ne faut pas retardé le soulagement qu'offre la chirurgie.

4. Un plaidoyer pour les opérations moins retardées ne doit pas être confondu chour un plaidoyer pour une operation précoce.

5. L'iléostomie ne guérit pas la colite ulcérative. Il n'est pas rare que la situation s'aggrave après l'iléostomie. Les perforations et les hemorragie grâves sont survenues des semaines ou des mois après l'iléostomie. Les cas marqués guéris par une iléostomie précoce auraient certainement donné de bons résultats si on avait mis le malade au lit, si on lui avait donné une haute alimentation protéine et aussi si on avait maintenu son moral.

6. L'iléostomie doit pas être considérée comme premier pas menant à la colectomie. Les cas dans lesquels on peut rée tablir la continuité du tube intestinal sont très rares et dans mon opinion indiquent une erreur de jugement par rapport à la nécessité de l'iléostomie et ne sont pas un argument pour l'iléostomie précoce.

7. Une colectomie est indiquée aussitôt que possible après une iléostomie quand une lésion cancéreuse est soupgonnée ou démontrée et aussi en présence de polypose accompagnée d'un écoulement persistant de pus et de sang. Autrement, la colectomie peut être ajournée pour une durée de 6 a 12 mois.

8. Les victimes de cette maladie seront soumises à traitement chirurgical. En agissant ainsi, on diminue l'état d'invalidisme chronique, une haute mortalité opératoire et même la fréquence de tumeurs malignes sera réduite sera dans beaucoup de cas.

9. Le traitement ne doit pas être partagé entre médical et chirurgical; le traitement médical seul suffira dans la majorité des cas. Pour les autres cas, une thérapie chirurgicale et medicale intensive est nécessaire. Dans le traitement de cette maladie, il est important d'avoir la coopération de collègues.

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Resection of Remaining Vertebral Ring for Tuberculosis of the Spine

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TUBERCULOSIS in joints is generally treated by distraction until spasm and pain are relieved and till the temperature becomes normal. The parts are then allowed to come together and are encouraged to heal in an optimum position by immobilization

In the case of the spine, the wish to reconstruct the original anatomical and exterior shape has formerly blinded us to the fact that, in using extension, we are distracting the diseased parts leaving a considerable 'empty' space filled with tubercular debris (Figs 1 and 2).

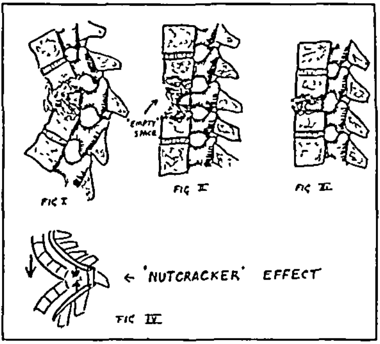
One still finds in textbooks various, sometimes fantastic, methods of reducing the kyphosis and in numerous cases these traditional principles are still acted upon

It must be obviously wrong to treat tuberculosis of the spine by extension, thus asking the tuberculous focus not only to heal itself, but also to make new bone to fill up the gap and that while the patient is kept recumbent in a plaster bed Physiologically and pathologically, one can only expect new-bone formation where the stresses and strains in the body bring the need for such a bone formation home to the tissues concerned. It is too much to ask a theoretical knowledge of what is needed from the body cells themselves

It was with this in mind that the operation here described was conceived.

On considering what happened when a tubercular spine is extended and the kyphosis reduced, it was realized that the remaining part of the ring, with the spine and the interarticular processes, is the main cause of the 'opening up' of the tuberculous focus. The idea occurred that the removal of the vertebra remains would make it possible to obtain a spine in which the remains of the bodies of the vertebrae would be in close apposition, while, at the same time, a spine would be obtained in which the stresses and strains would more closely approximate the normal. In other words a condition would be obtained where the sharp angulation would not put all the weight-bearing (multiplied by extra leverage and not counteracted by the sacrospinalis mass which is working at a disadvantage over the hump) on recently diseased tissues (Fig. IV)

Theoretically, it seemed that when the rest of the diseased vertebral ring was removed the articular facets of the vertebra above would engage with those of the one below, for generally the angle of their incidence changes little from vertebra to vertebra.



The spinal cord hangs relatively loose in its meningeal envelope, and the spinal nerves trail downwards before they emerge through the intervertebral foramina. A shortening of the spinal canal, of the dimensions which would obtain in such a theoretical case, (that is, at most three quarters of an inch) would result in no more than the spinal cord hanging slightly lower in its canal and the spinal nerves sagging slightly on their way from the cord to the interv[illegible]al for[illegible]a.

The only doubt was that the spinal nerves, emerging both through one intervertebral foramen, might get nipped. It was considered that the remaining debris of the collapsed vertebra would be sufficient to keep the foramen open wide enough to prevent this.

The theory having been formed, it was necessary to wait until a suitable case appeared.

In July 1947, a young native woman was admitted to the Krugersdorp hospital who seemed to fulfill all the requirements. She was a hopeless case, and if relief could be given the risk of this operation was justified.

CASE REPORT

Nono was a native girl, age 20. Every member of her family had died of tuberculosis, in one form or another. Five years ago a marked kyphosis had been noticed and for about a year she had been unable to walk because of a paresis of both legs. There was no urinary complication.

On examination it was found that she was in the final stages of toxemia, thin, hollow-cheeked and no more than semicomatose. There was practically complete paralysis of both legs. No reflexes could be elicited and attempts at voluntary movement resulted in no more than a hardly perceptible twitching of the knee and a slight downward movement of the feet.

In the upper part of her lumbar region, there was a high, sharp, pointed kyphosis.

Fig. V shows the condition on admission as defined by x-ray. Important details are indicated by outlines.

L. 1 has to all intents and purposes completely disappeared. D. 12 is totally destroyed in its lower third and disease-riddled in its middle third, while L. 2 is very badly affected in its upper third.

Fig. 2 shows what would have been the result if the old method had been used, and it is obvious that extension of this spine would have had no possible hope of success.

On Aug. 1, 1947, under general anesthesia and in a prone position of the patient, the bony gibbus was exposed by a door-flap incision. The remains of the atrophied muscles were dissected free from the underlying spinal column towards the right. With a chisel the spinous process of L. 1 was severed at its base and the ligaments connecting it with the spines of D. 12 and L. 2 were cut through.

Leaving the spine attached to the left sacrospinalis mass, the latter was also dissected loose from the underlying bone and retracted laterally, thus exposing the whole spinal column in the diseased region.

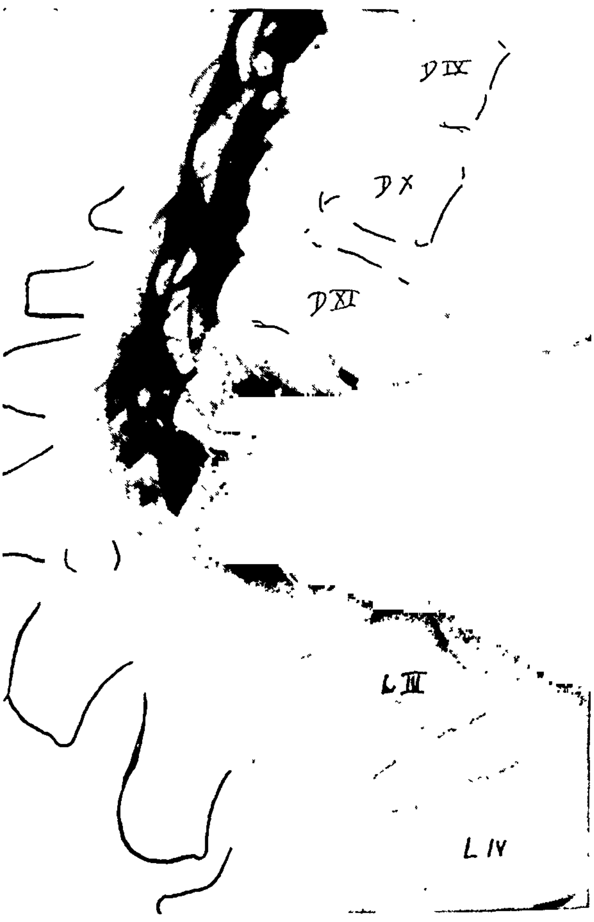


Fig. 5

With a Rongeur and Liston's bone scissors, the lamina, the interarticular masses with their superior and inferior facets, as well as the transverse processes, were carefully removed.

Between the now exposed articular facets of D. 12 and L. 2, the rounded ends of the roots of the vertebral arch of L. 1 were visible and these were cautiously nibbled away with narrow, long Rongeurs.

While doing this, the right root came out altogether, followed by a small amount of caseous material. With a sharp spoon some more of this material was carefully fished out, so as to lessen the chance of more of it finding its way into the actual wound.

Moderate pressure on the back of the patient closed the opening between the arches of D. 12 and L. 2 and, as had been theoretically worked out, the facets in the spine came together and articulated as if L. 1 had never been.

The spinous process of L 1, (still attached to the sacrospinalis mass) was split sagitally, the exposed parts of the surrounding vertebrae were roughened and chipped to promote future callus formation and the periosteum was scraped off the lateral surfaces of the spines of D. 12 and L. 2. The half of the spine of L. 1, which was still attached to the muscles, was fitted to the left and the loose half was fitted to the right side of the spines of D. 12 and L. 2 With strong chromic catgut they were fixed in this position to help to form a bridge across the potential gap. The muscles were allowed to fall back and the wound was closed.

With the patient still in the prone position, a thick plastercast was applied over the back of the patient, and when this had become fairly hard she was turned over in it, transferred to a stretcher and thence placed on a previously prepared stand on her bed

She stood the operation well and has never complained of the feared root pain. (A second case done recently has also not complained about this.)

Healing took place without any complications and after a few weeks a marked improvement was noticed by the physiotherapist who was entrusted with keeping the muscles in as good a condition as possible.

Six weeks after the operation, the patient's condition had so greatly improved, and movements had come back to such an extent that it was deemed possible to put into practice the second half of the argument, namely that active movement of the body, combined with immobilization of the diseased area, is the ideal to be aimed at.

On Sept. 11, 1947, she was taken from her bed and the plaster jacket was applied in extension, as for a fractured spine. One week later, albeit with support on both sides, she took her first steps.

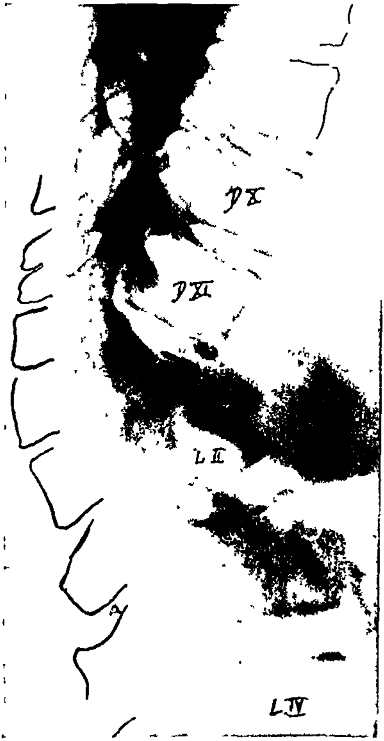


Fig. 6

Her general health improved out of all recognition, she put on weight day by day. Her mental torpor disappeared and she had the first menstruation of her life In another week she was able to get about, supporting herself from bed to bed in the ward.

Since then she has been slowly improving and, although there is as yet no perfect control of the limbs, and probably this will never be achieved, she can now get about reasonably well on her own. Fig. VI shows the x-ray condition at the time of writing, (a year and a half after the operation) detailed schematically by outlines.

There is ample evidence that the lesion is healing as was hoped. At present it is certainly quiescent (an A.P. view shows calcification of the rudimentary psoas abscess).

DISCUSSION

As stated in the preamble, this single case does not actually prove anything but, as a confirmation of a theoretical thesis, it does indicate that there is a possible practical application of the theory. It has been done. It must be conceded that this case was not as simple as those considered in the theoretical discussion but a trial with this new method was not considered justified in an average case which had a reasonable chance of success with the old method.

The lack of material and facilities make it impossible for the writer to establish the indications and counterindications for the application of this method in the manner he would like to do and which is necessary before final judgment can be pronounced. He will have to leave this to those who are able to do so but he is convinced that eventually somewhere in the treatment of tuberculosis of the spine, his idea will prove to deserve a definite place.

SUMMARY

The method of treating tuberculosis of the spine in recumbency and with the maximum of extension obtainable should be reviewed and more publicity should be given to the fact that maximum extension and reduction of the kyphosis is not per sé a desideratum.

The healing process in kyphosis by rerecumbency is possible but the resultant condition puts excessive strain on the newly healed bone because the weight of the body is applied by strong leverage in the manner of a nutcracker, with the arch of the diseased vertebra as the short 'fulcrum-piece.' The muscles that have to counteract this leverage, are working at a disadvantage by being stretched over the kyphotic hump.

As this operation shows, it is *possible* to achieve a compromise by excising the rest of the diseased vertebra, which makes it possible to obtain removal of, or at least a diminishing of the kyphosis without distraction of the diseased vertebra and the causing of a 'vacuum' which has to be filled with new bone by a diseased tissue.

In the case described, the process had already gone exceedingly far and full straightening of the spine was not possible, although the kyphosis has clinically practically disappeared. If this operation was done in less pronounced cases, complete straightening of the spine should be possible.

With the achieved straightening of the spine, the absence or practical abolition of the crushing leverage and the restoring of the sacrospinalis muscle to a more normal position, it may be possible to treat these cases in a plaster jacket instead of by the usual plaster bed which must be inductive to disuse-atrophy. In this way the lost years of recumbency may be avoided.

RIASSUNTO

Ritiene che il metodo di cura della tubercolosi della colonna vertebrale con reclinazione ed il massimo possibile di estensione vada modificato, perche' l'estensione e la riduzione della cifosi non costituisce un risultato veramente favorevole. La guarigione in cifosi mediante reclinazione e' possibile, ma le condizioni meccaniche che ne derivano sottopongono ad uno sforzo eccessivo il tessuto osseo neoformato in quanto il peo del corpo gravita alla maniera di una leva troppo lunga di uno schiaccianoci, avente quale fulcro molto corto l'arco della vertebra ammalata. I muscoli che debbono neutralizzare questo squilibrio vengono sottoposti ad uno sforzo eccessivo, in quanto sono stirati al disopra della bozza cifotica. L'operazione ideata dall' A. la quale consiste essenzialmente nell'escisione della porzione ammalata della vertebra, elimina o riduce almeno la cifosi, senza provocare una lacuna che deve essere poi colmata da una neoformazione ossea da parte del tessuto ammalato. Nel caso illustrato dall'A. l'operazione pure avendo clinicamente eliminato la cifosi, non ha consentito un completo raddrizzamento della colonna vertebrale in quanto il processo tubercolare era gia' troppo progredito. In casi meno avanzati cio' sarebbe invece possibile.

Con il raddrizzamento della colonna vertebrale, l'eliminazione di forze cinetiche opposte, il ritorno dei muscoli sacro-spinali ad una posizione piu' corretta, e' forse possibile curare questi casi con una semplice giacchetta ingessata invece di lunghi anni di degenza nel solito letto di gesso.

SUMARIO

El tratamiento de la tuberculosis de la columna vertebral por el metodo de traccion maxima en recumbencia, debe de ser revisado por cuanto este tratamiento no es per se el desiderato.

El proceso de cicatrizacion de la cifosis por recumbencia es posible, pero la condicion resultante pone una tension excesiva en el hueso neo-formado, porque el peso del cuerpo actua como una palanca en la forma de un crucidor de nueces, con el arco de la vertebra afectada sirviendo de fulcro. Los musculos que se oponen a este leverage trabajan desventajosamente por cuanto son estirados por la cifosis.

Como esta operacion ha demostrado, se puede obtener un compromiso por la reseccion del segmento de la vertebra afectada, lo *suficiente para eliminar or disminuir la cifosis,* sin distraccion de dicha vertebra o sin causar un vacio que requiere mas tarde su relleno por nuevo hueso del tejido enfermo.

En el caso descrito, el proceso habia avanzado mucho lo que evito el enderezamiento completo de la columna; no obstante la cifosis se corrijio clinicamente. Por lo tanto se esta operacion se practica en casos menos avanzados el enderezamiento seria mas completo.

Con el enderezamiento de la columna, la ausencia o abolicion de la palanca arriba mencionada, y la restauracion de la posicion del musculo sacrospinal, puede ser posible el tratar estos casos con el enyesamiento parcial *en forma the saquito,* y asi evitar los anos de invalidismo en recumbencia.

SOMMAIRE

Une méthode de traitement de la tuberculose *vertébrale par rapport* avec le maximum d'extension obtenue devrait être etudiée et on devrait donné plus de publicité au fait que l'extension maximum est la réduction de la kyphose et n'est pas par soi même un désidératum.

La réduction de la kyphose et la guérison de la kyphose par le séjour au lit, est possible. Mais les conditions qui résultent mettent une traction excessive sur l'os récemment guéri, vu que le poids du corps est employé de la façon d'un levier, avec l'arche de la vertèbre malade comme point d'appui. Les muscles qui sont obligés de contre-balancer cette traction, travaillent à un désavantage parce qu'ils sont distendus au-dessus de la bosse kyphotique.

L'opération préconisée par l'auteur montre qu'il est possible d'achever un compromis en *faisant l'ablation de la vertèbre malade qui* permet d'enlever ou de diminuer la kyphose sans distraction de la vertèbre malade et sans causer de "vacuum" qui aurait besoin d'être rempli par une production d'os nouveaux par un tissu malade.

Dans le cas décrit, la maladie était d'un état avancé et on ne pouvait pas corriger complètement la difformité de la colonne vertébrale bien que le kyphose a disparu cliniquement presque entièrement. Si cette opération est faite dans des cas moins avancés, il est possible de corriger complètement la difformité de la colonne vertébrale.

En corrigeant la difformité de la colonne vertébrale et en restaurant les muscles sacro-spinaux en une position plus normale, il est possible de traiter ces cas avec une camisole de plâtre et d'éviter ainsi une atrophie dûe au non-emploi. Par ce procédé le séjour au lit est abrégé.

Postoperative Intravascular Thrombosis

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POSTOPERATIVE intravascular thrombosis is a major problem. Like most renegades, it can be detected masquerading under a variety of aliases of which "atypical pneumonia," "simple pleurisy" and, most brazen of all, "pleurodynia," which are but a few. Indeed it seems justifiable to regard all postoperative chest conditions as possibly thrombotic, unless a clear diagnosis to the contrary can be made at the bedside. This is of special importance when the pain is left-sided, as coronary occlusion is usually first choice. In pulmonary thrombosis pain can radiate down the arm and into the neck; shock is often present and in the early hours few physical signs of lung involvement may be demonstrable. However, if one believes in treating both conditions with anticoagulants the margin of error is eliminated.

ETIOLOGY

All clinicians are familiar with the pathologic arguments in favor of venostasis playing an essential role in the onset of the condition. The labored anatomical evidence of extra and intravenous pressure of the femoral and iliac veins, also holds an honored place in the etiological edifice. These factors are a constant, but the disease is a variable. The simple, neat explanation, that blood clots in the limb veins and bits break off as emboli to cause lung involvement, is inadequate. Most reported series of pulmonary thrombosis state that in half the cases the condition first becomes apparent in the lungs. In many of these patients, the legs never become involved—even in the absence of specific therapy. A similar state of affairs exists in reported autopsy series. Careful dissection of the peripheral venous system fails to demonstrate intravascular thrombosis, or any donor site from which an embolism may have been detached. It is false logic in the face of this knowledge to argue a universal embolic origin for all lung thrombosis.

In some of the earlier reported autopsy series of pulmonary thrombosis, involvement of the leg veins was found in up to 90 percent of cases. This observation does not necessarily prove, as has been accepted, that the lung thrombus was therefore secondary to that in the legs. Surely it is equally reasonable to assume that the condition will spread progressively through the venous system the longer the patient lies immobile and untreated. Such a patient may initially develop a "pleurisy" and, within a week, have involvement of both legs and both lungs. Cases of this nature were numerous before the use of the anticoagulant drugs, but now they are rare. It is too much to expect that, treating a patient with an established thrombosis of the leg with heparin combined with active bed movements, and getting him up in several days, should reduce the incidence of "embolism." Indeed nothing more conducive to the detachment of loose fragments could possibly be conceived. Yet where this therapy is practiced, "embolism" is exquisitely rare.

Murray of Toronto reports a series of 371 cases of leg thrombosis treated by heparin without "embolism" occurring. The author has treated a similar number (the great majority also being up in three days) with identical results.

The story of heparin treatment of established lung thrombosis provides a parallel phenomenon. Murray treated 149 such cases with no fatalities. The author has had a similar experience. Recurrences, when treatment is adequate, are very uncommon. When immobilization, prolonged bed rest and "watchful expectancy" were the therapeutic measures, death was all too frequent and serious recurrences were often seen. It would seem that the anticoagulants exert their magic by preventing fresh foci of thrombosis developing in vessels of the legs and at the lung bases. From a consideration of these facts, one is compelled to feel that many, if not the majority, of lung thrombosis are of primary origin in the vessels at the lung bases and not embolic at all.

There are some who find difficulty in ac-

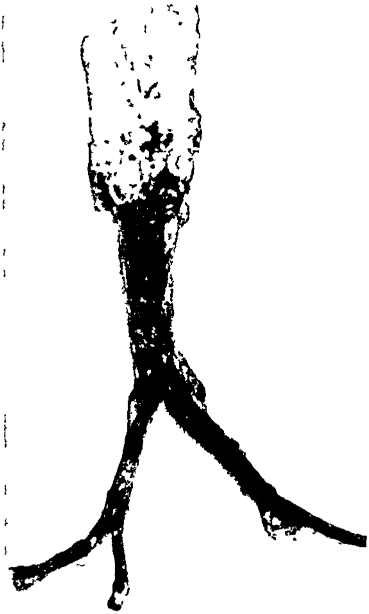

Fig 1

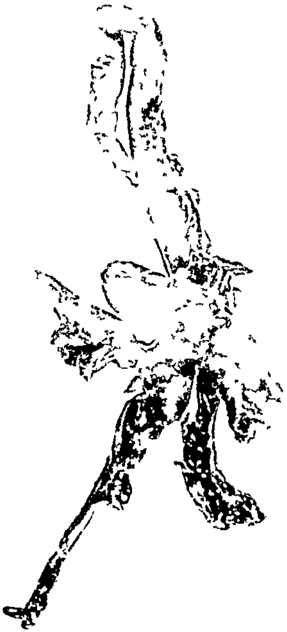

Fig 2

cepting the belief that thrombosis can develop primarily in the pulmonary arteries, because they are arteries and presumably not subject to stasis This is an erroneous conception and Fig 1 illustrates that the condition developed postoperatively in the aorta and common iliac vessels Fig 2 shows that true major embolism also occurs This tarantula clot was preformed in the right femoral and profund vessels in a patient who had been nursed in a plaster jacket for some weeks Sudden death occurred The ideal therapy is to prevent thrombosis in any large vessel, and thus obviate further extension or embolism This is not an insuperable problem, as much is known of the clinicopathologic changes associated with the onset, and as these changes are demonstrable before thrombosis occurs, prophylaxis is possible

Clinical Clinicians have long realized that otherwise unexplained rises in the pulse temperature and respiration rate are frequently followed by thrombosis Of special importance is the persistence of pyrexia of 99 100°F for several days Most significant is a sudden isolated rise in all three which may or may not be associated with subjective symptoms This phenomenon should never be regarded lightly as due to constipation or such minor incidents of convalescence It is so often followed by thrombosis that it should be regarded as a prethrombotic manifestation

Pain or swelling in the legs or *minor chest* complications are almost invariably thrombotic and unless the clinician has strong contrary reason anticoagulants should never be withheld

Pathologic: The onset of thrombosis is most common during the second postoperative week, and it has been shown that three pathological changes, directly associated with the circulating blood, also are usually present at this stage.

First, there is an increase in the plasma fibrinogen content; second, the platelets increase in number and "stickyness"; and third, there is generalized venostasis. It would appear that some correlation exists between these phenomena and the development of thrombosis. It is thought that three factors are primarily involved in the formation of thrombus within vessels. These are (1) the increase in plasma fibrinogen of a qualitative nature (termed by Lyons—fibrinogen B); (2) the presence of venostasis—either locally as in varicose veins or as a generalized state; (3) the presence of degeneration of the vessels either locally or generally.

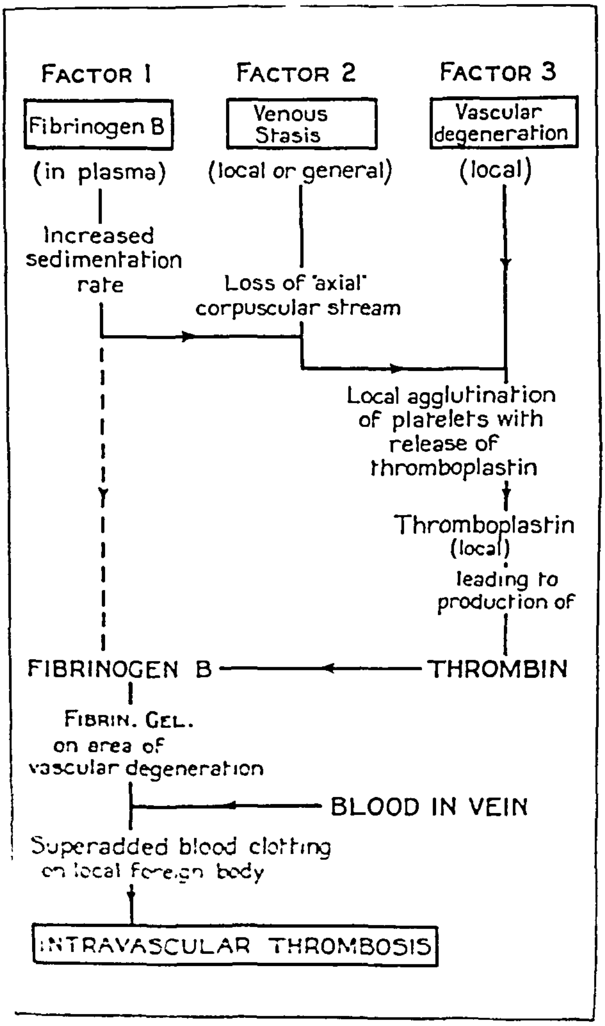
FACTOR 1
Fibrinogen B
(in plasma)
Increased sedimentation rate
FACTOR 2
Venous Stasis
(local or general)
Loss of 'axial' corpuscular stream
FACTOR 3
Vascular degeneration
(local)
Local agglutination of platelets with release of thromboplastin
Thromboplastin (local)
leading to production of
THROMBIN
FIBRINOGEN B
FIBRIN. GEL. on area of vascular degeneration
BLOOD IN VEIN
Superadded blood clotting on local foreign body
INTRAVASCULAR THROMBOSIS

Fig. 3

The suggested inter-relationship of these various factors is set out in Fig. 3 (From B. T. Mayes, Textbook on Obstetrics).

DISCUSSION OF FACTORS

Fibrinogen B: The presence in plasma of a variant of fibrinogen, which he called fibrinogen B, was described by Lyons in 1945. It is rarely present in the plasma of healthy individuals, but it is found in increasing amounts in sick patients, following operation and childbirth. It is almost universally present when intravascular thrombosis occurs, though it frequently disappears after the thrombus has developed. Blood sedimentation rate is accelerated by the presence of appreciable amounts of fibrinogen B. The mechanism of blood coagulation, as suggested by Lyons, is shown in Fig. 4.

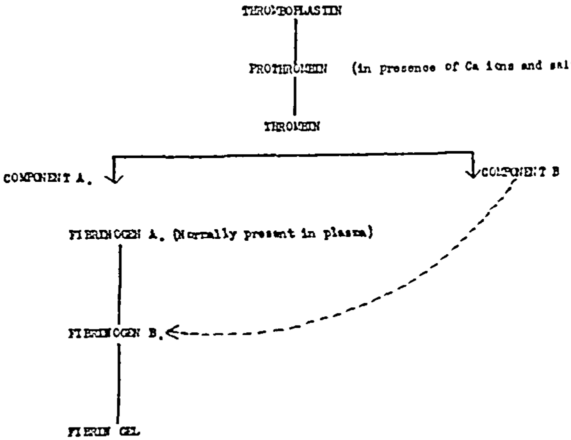
THROMBOPLASTIN
PROTHROMBIN (in presence of Ca ions and salts)
THROMBIN
COMPONENT A.
COMPONENT B
FIBRINOGEN A. (Normally present in plasma)
FIBRINOGEN B.
FIBRIN GEL

Fig. 4

In such patients as have fibrinogen B free in the plasma, it can be said that they are so much closer to thrombosis than their more fortunate brethren who have only the normal fibrinogen (which Lyons terms fibrinogen A). It is wrong to presume that the mere presence of fibrinogen B, even in gross amounts will inevitably lead to thrombosis, as it appears necessary for thrombin component B to appear in the plasma to convert the fibrinogen B to fibrin gel. This, of course, only appears in plasma when platelets have fragmented and released thromboplastin This is possibly one of the main roles of venostasis which permits the aggregation of platelets, and their destruction to occur In addition, the development of *venostasis (by slowing down the flow of blood)* permits the loss of the axial stream of formed elements and so allows them to move to the periphery and dawdle along the vessel endothelium and become entrapped at any area where degenerative change has occurred

The increased sedimentation rate which is associated with the presence of free fibrinogen *B, accentuates this sifting out of the formed* elements When fibrin gel is formed, all that is required for a thrombus to propagate, is blood clotting by the normal mechanism to take place upon the intravascular foreign body, constituted by the small mass of fibrin gel

Thrombosis can occur when only factors two and three are operating This is seen clinically in the development of thrombus in large varicose veins or following the use of indwelling venous needles or cannulae The only occasions when intravascular thrombosis develops in the vessels of the *legs or lungs in the absence of* fibrinogen B are as an exacerbation of a preexisting thrombus, or an initial thrombosis in the immediate postoperative period The former is seen as a "recurrence" of a leg or lung thrombosis, and is due to the normal blood clotting mechanism occurring upon the preexisting clot which acts as an intravascular foreign body This condition is always at the site of the initial lesion The latter type is seen in the first 48 hours after operation and appears to be due to the formation of considerable amounts of intravenous thrombin during a long operation with excessive tissue trauma

Blood Coagulation Time There is presumptive experimental and clinical evidence that a phase of shortened blood coagulation may be associated with states of intravascular thrombosis The more accurate methods of regularly measuring this are time consuming laboratory procedures, and it has been the author's experience that as much information can be obtained by use of the bedside capillary tube technic at room temperature This is at least so in the temperate zone With a little tuition, the nursing staff can perform this test as often as indicated It must be realized that the readings are not quantitatively accurate but the form of the graph, which can be compiled, is of extreme qualitative importance

In brief it can be said that when the coagu*lation times, taken twice daily (or more fre*quently), remain consistently above four minutes and vary from estimation to estimation —then thrombosis rarely occurs If, however, the time is found to fall to or below four minutes and remain there for three consecutive hourly estimations, then thrombosis is a possibility On the face of the simplicity of the *test and the many academic arguments against* its scientific accuracy, much criticism has been advanced In answer it can be said that for a period of one year all the thromboses (five in number) which occurred in the Urology Department, Royal Prince Alfred hospital, Sydney, were anticipated by this method

For the next 18 months whenever the coagulation time on any postoperative patient fell to four minutes and remained there for three hours, 5000 units of heparin were given intravenously and no case of thrombosis developed throughout the entire period It is certain that *quite a few cases were given odd injections of* heparin who would not have got thrombosis anyway, but the point of value was that all the incipient thromboses were included in the suspect group and did not come to fruition The tests were performed accurately and conscientiously by the nursing and medical staff and little doubt appears that any real success in this prophylactic measure was due to their care It is essential that the nursing staff knows what they are doing and why, and the proper way to do it

The technic adopted in the performance of the capillary tube coagulation test is as follows a drop of blood is expressed by needle puncture from the finger and allowed to run up a capillary tube of relatively standard size (Fig 5) Minor variations in size of the tube do not appear to be important After waiting for three minutes a small fragment of the tube is broken off carefully by producing fracture of the glass with the thumb nails This should be done with care as a thin thread can be easily destroyed At minute intervals this procedure is repeated until a thread appears indicating that clotting has occurred The finger is always allowed to dry if antiseptic is used for cleansing. Any moisture remaining in the crevices removes all value from the procedure. The index finger and thumb are never used in case of infection developing, which appears as a remote possibility and has not been seen in many thousands of tests. The finger pulp is never used as it causes unnecessary pain and the finger edge beside the nail is preferred. Sufficient blood is produced with one maneuver to fill the capillary tube. If this cannot be achieved then a separate puncture on another finger is made, as false readings may be obtained because of the production of excessive thromboplastin. On warm days there is a shortening of the coagulation time as compared to cold days. This does not affect the qualitative value of the graph.

Fig. 5

TREATMENT OF ESTABLISHED THROMBOSIS

When thrombosis occurs, either in the legs or lungs, then anticoagulants are essential. There are few exceptions to this rule and they are primarily of hemorrhagic nature. Peripheral vein interruption of any kind is considered by the author to be an unnecessary procedure of extremely doubtful value and not free from grave consequences. When it is used as a prophylactic measure in a patient not suffering from thrombosis, it is little short of meddlesome.

Much of the dissatisfaction felt by some to the use of anticoagulants arises from the failure to adopt a standardized method of therapy. Inadequate or excessive doses of the drugs are given in a vague manner without a real appreciation of their properties and with few guiding criteria. Postoperative thrombosis is a disease of short duration. It is rare for treatment to be required for more than a week. Therefore heparin and dicoumarol should be regarded as precision drugs for use over this limited period.

The therapeutic technic adopted by the author is illustrated in Fig. 6.

Heparin must be given for the first 48 hours as dicoumarol will not be working effectively until the third day. It is best to give the heparin into the tube of an intravenous saline drip. This is done by the nursing staff and assures that the heparin will be given at regular fourth hourly intervals. The first 35,000 units are given as a standard course. On the second day the coagulation time is estimated by the capillary method at fourth hourly intervals and 5000 units given if it has fallen below 10 minutes. This figure is chosen arbitrarily and has been a most satisfactory guide in actual practice. If the time is greater than this then the heparin is omitted for that dose. It may be

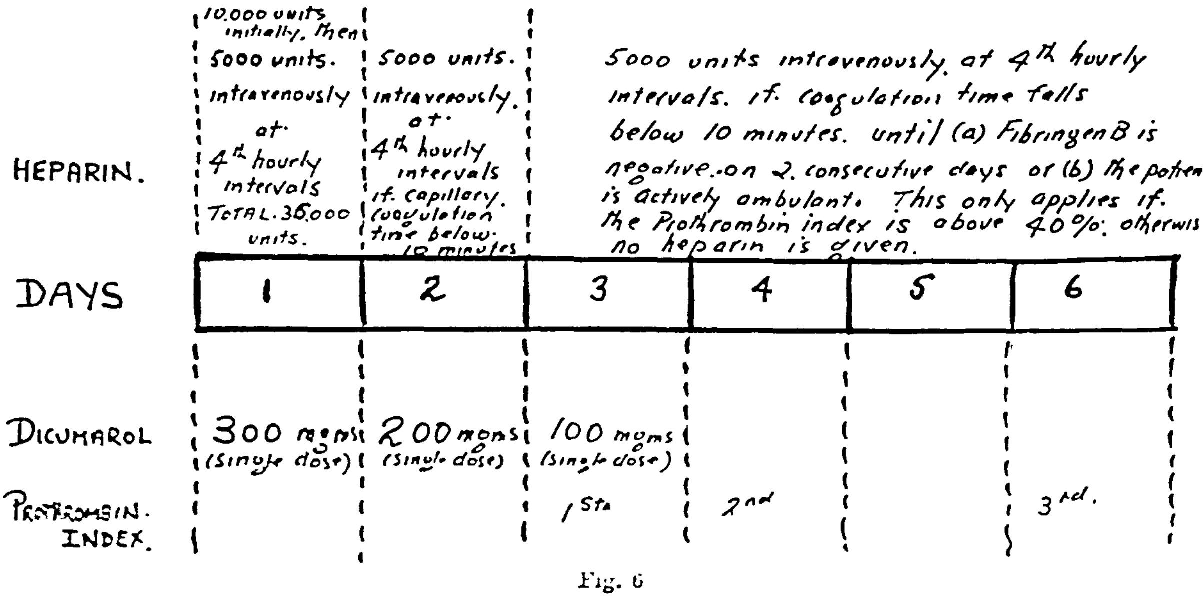
10.000 units initially, then 5000 units. intravenously at 4th hourly intervals TOTAL. 35.000 units.
5000 units. intravenously. at 4th hourly intervals if. capillary. coagulation time below 10 minutes
5000 units intravenously. at 4th hourly intervals. if. coagulation time falls below 10 minutes. until (a) FibringenB is negative. on 2. consecutive days or (b) the patient is actively ambulant. This only applies if. the Prothrombin index is above 40%: otherwise no heparin is given.
HEPARIN.
DAYS
1
2
3
4
5
6
DICUMAROL
300 mgms (single dose)
200 mgms (single dose)
100 mgms (single dose)
PROTHROMBIN. INDEX.
1st
2nd
3rd.

Fig. 6

necessary to change the saline drip over to another vein on the second day. Veins in the cubital fossa are not used if possible as patients do not like it and soreness is a common aftermath.

The rate of the saline drip is never more than 30 drips per minute. It may be unwise to use the intravenous saline in cases where cardiac involvement has occurred but in actual practice this has been found to be rarely a prohibition at any rate by the second day of treatment. The drip is suspended on the morning of the third day and at least five hours are allowed to elapse when a specimen of blood is taken to estimate the prothrombin index. If a shorter interval is permitted then the reading is valueless as there is confusion between a heparin and a dicoumarol effect.

The clinician wants to know what depression of the prothrombin index has been achieved by the dicoumarol which has been given and this estimation, if correctly done, will give him the answer. Dicoumarol was given in a single dose of 300 mg. on the first day of treatment followed by a further single dose of 200 mg. on the second and 100 mg. on the third day. When the blood for estimation of the prothrombin index is taken on the afternoon of the third day it can be presumed that the dicoumarol given on the first day will be exerting its effect while the 200 mg. of the second day may or may not be acting. Certainly the 100 mg. given on the third day will not be producing its effect. Upon this vital reading assessment for the future management of the case can be made. The responses to dicoumarol can be arbitrarily classified into three groups.

Group 1: (Prothrombin index in the normal range of 100 to 70 percent.)

It is evident that the patient is either resistant to the drug or merely a "slow starter." Heparin must be continued throughout the third day with this type of response and the prothrombin index repeated on the fourth day, (at least five hours after the last dose of heparin). If there is no evidence of further depression then in all probability the patient is resistant and dicoumarol should be abandoned although cases do occur where a depression of the prothrombin index may follow several days later. It is dangerous to calculate on this and far better to continue with heparin alone. However, should a definite depression of prothrombin actively be shown by the test on the fourth day, then the future management is merely a "slow starter."

Group 2: (Prothrombin index in the 70 to 50 percent.)

This is the most commonly found response and the value is nearer 50 percent than 70 percent; let us say 55 percent. Then it can be presumed safely that the next day (fourth of treatment) the reading will be in the order of 40 percent and still likely to be further depressed as all the 200 mg. given on the second day will be acting and probably the 100 mg. given on the third day. Heparin is considered unnecessary on any day that the prothrombin index is likely to be in the order of 40 percent to 50 percent. Thus the fourth and fifth days are safe periods against extension of thrombosis. The prothrombin index should be repeated on the morning of the sixth day. If it is above 50 percent and the patient is not ambulant and fibrinogen B is still present in the plasma, then 200 mg. of dicoumarol should be given. This will not be effective throughout the sixth and early part of the seventh day, so heparin should be given intermittently on these days whenever the blood coagulation time falls below 10 minutes

In those rare cases where these criteria are still present after the seventh day, it is necessary to persist with heparin and dicoumarol as indicated by the blood coagulation time and the prothrombin index. On any day that the prothrombin index is or is presumed to be above 50 percent then 5000 units of heparin should be given intravenously whenever the fourth hourly blood coagulation time is below 10 minutes. In cases of postoperative or postpartive thrombosis it has been extremely rare in the author's experience for treatment to be necessary beyond the eighth day and for more than 800 mg. of discoumarol to be required.

Group 3: (Prothrombin index less than 50 percent.)

Cases of this nature are satisfactory from the viewpoint of prevention of thrombotic extension but must be handled with care as the prothrombin index may fall even as low as 20 percent by the fourth or fifth day.

Bleeding may occur, but in the author's experience this has happened rarely and has been of only minor nature when a dosage not exceeding 600 mg. has been used. In view of this, active measures to restore the prothrombin index to a higher level are not taken except for special reasons, as after all such a state of affairs merely represents the fulfillment of the therapeutic objective. Worrying hemorrhage is so rare on this dosage that a policy of "leave alone" is best. This is especially so, as many of these cases of quick response to dicoumarol show an equally quick recovery and the prothrombin index estimated on the sixth day may often show a return to normal.

HEMORRHAGIC COMPLICATIONS

Bleeding has not occurred following the use of intravenous heparin in the manner described. With larger doses this complication may be seen but as the effect of heparin rarely lasts beyond five hours it is usually self-terminating. With dicoumarol, bleeding is rare on 600 mg. and then only of minor degree. Several severe bleeds have occurred when 800 mg. have been used. With greater dosages several quite severe hemorrhages were encountered even when careful control was maintained by daily prothrombin index estimations. There is an occasional tendency for an otherwise well regulated patient to suddenly "dip" overnight to an unanticipated severe depression of prothrombin activity.

The treatment of hemorrhagic complications of dicoumarol therapy is to suspend the drug and restore the prothrombin index to normal as rapidly as possible. This can be achieved by the use of fresh whole blood or intravenous vitamin K. When the former is used it must be realized that the blood should be collected at least on the same day and that it should be given as quickly as is possible as the object is to restore prothrombin quantitatively. A slow drip is of very limited value. If the patient is unable to tolerate anything other than a slow transfusion, then vitamin K should be used as well. The author has used Synkovite consistently for purposes of standardization. This is given intravenously in a single dose of 60 mg. In one case where the prothrombin index was less than 20 percent, restoration to 11 percent occurred in 12 hours. The effect of vitamin K is delayed for some hours and for this reason blood should be used as well.

Heparin Sensitivity: Six cases have been encountered which appear to be due to the development of a sensitivity to heparin. The minimum period observed between the conclusion of heparin treatment and the injection which produced symptoms has been seven days and the longest period three months. The first case was given 5000 units (5 cu. cm.) and immediately complained of severe pains in the loins. Death was instantaneous. Autopsy showed only the healed basal lung infarction for which heparin had been given initially and from which there had been clinical recovery. The possibility of death being due to sensitivity was suggested by the surgeon in charge of the case. Since then it has been the custom, when heparin is to be given again at any period longer than a week after previous use, to inject a small dose of 250 units and wait for five minutes.

If nothing untoward occurs then a further 250 units are given and again five minutes are allowed to elapse. Then two doses of 500 units each are given at five minute intervals and thereafter the rest of the dose of 5000 units. In five cases there was complaint of severe loin pain with weakness or even syncope. This happened after the second 250 unit dose in the cases observed. No further heparin was given and recovery was rapid in all instances. Three patients developed a generalized erythematous rash on the following day. This phenomenon was not confined to any one brand of heparin. Skin testing has not been used as a routine measure but did not appear satisfactory when used in selected cases.

Alternative Methods for Use on Anticoagulants: It should be realized that heparin and dicoumarol when used in the treatment of postoperative and postpartive thrombosis are precision drugs and should be used as such. The therapy period should be days, not weeks and the objects to be attained clearly defined and achieved with all possible accuracy. These criteria are defeated when heparin is used intramuscularly or subcutaneously or when dicoumarol is given in small divided doses. It is easy for the busy practitioner to rationalize that the simple method of giving heparin intramuscularly really benefits the patient It is true that this happens but *the response is delayed, variable* and may be unpleasantly prolonged. Furthermore, it is a very costly method of giving heparin. If dicoumarol is used in conjunction with intramuscular heparin the result is confusion as it is impossible to decide the all important point of the patient's response to dicoumarol. Intravascular thrombosis is an acute emergency and the elimination of the mortality rate of this disease is directly proportional to the promptness and adequacy of anticoagulant therapy.

ROLE OF FIBRINOGEN B IN INTRAVASCULAR THROMBOSIS

Postoperative cases in which fibrinogen B does not appear, or is present either in small amounts or transitionally, have not been observed to develop thrombosis except as a localized phenomenon in old superficial varicose veins or following intravenous medication.

After the development of a thrombosis, either in the leg or lung, fibrinogen B may disappear from the plasma almost immediately. If it does not reappear then the development of thrombosis at fresh sites is rare

In patients, who are confined to bed and inadequately covered with anticoagulant, an exacerbation may occur at the site already involved. This is due to the normal mechanism of blood clotting proceeding upon the intravascular foreign body represented by the existing thrombus

When fibrinogen B persists or reappears in the plasma after thrombosis then both local extension and the involvement of fresh vessels may occur in the absence of satisfactory anticoagulant therapy. It has been in this type of patient that almost all the recurrences, personally encountered, have developed.

There appears as yet no certain method of clearing the plasma of fibrinogen B therapeutically, and the protection of the patient depends upon the use of anticoagulants and prevention of venous stasis Active ambulation reduces the necessity for anticoagulants and this should be enforced at the earliest opportunity. There are few cases which cannot be ambulant within the week of anticoagulant therapy.

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The Treatment of Peptic Ulcer by Vagotomy*

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ETIOLOGY

CAUSAL FACTORS: Ulceration of the stomach and duodenum, as elsewhere in the body, is probably due primarily to trauma from the abrasive action of hard, sharp particles of food. This will obviously be accentuated by hurried, careless eating and by poor dentition. Another factor which enters into the aetiology is that of sepsis, although there is some doubt as to whether this is actually a primary feature.

Böttcher[1] and Haines[2] were the first to describe the presence of organisms in the base and edges of peptic ulceration and their work was confirmed by the classical studies of Rosenow[3, 4, 5] and Sanford.[3] The organisms responsible for this sepsis are usually either diplococci or streptococci, and their source frequently lies in infection of the nasopharynx or teeth. It seems probable that ingestion of the muco-pus is the way in which the ulcer becomes infected and, if so, this mechanism provides a good explanation of the typical flare-up of a smouldering ulcer which occurs during an exacerbation of nasal catarrh.

Another possible factor which has been postulated by Von Bergman[6] is vascular spasm of the arterioles of the stomach or duodenum. It does not seem likely that this factor is as important as he thought, but it might explain the undoubted influence of temperature change on ulcer exacerbations.

General toxaemia, such as that which occurs following widespread cutaneous burns, may also play a part in particular cases. This effect was first described by Long[7] and Curling,[8] being confirmed later by the work of Perry and Shaw.[9] It seems probable that the action of these toxins on the stomach is analagous to that produced by histamine in the experimental animal. It has also been thought by Pottenger[10] that toxic neuritis may be an additional causal factor. In his experiments on rabbits he noticed that the progress of tuberculous lesions was slowed-up by division of the vagal nerve supply from the area in question.

The Ulcer Diathesis: When an acute ulcer develops through a combination of any of these factors, the natural healing processes of the body are opposed by two main mechanisms—the peristaltic movements and the gastric acidity. Despite this handicap, however, it has been shown by Dragstedt[11] that these lesions normally tend to heal spontaneously and it seems likely that the mucus secreted by the intestinal glands may have a considerable protective action. Another possibility is the insulating effect of the epithelial layer recently described by Duran-Jorda.[12, 13] There is little doubt that the incidence of acute gastric ulceration is considerably higher than is generally realized, although it is extremely difficult to procure direct evidence, since these lesions usually heal without leaving any visible scar. If this is so, why do these acute lesions fail to heal successfully in certain particular instances and develop into a chronic ulcer? The answer to the problem must be sought in a consideration of the ulcer diathesis.

It has been recognized for many years that a true ulcer diathesis does exist. The typical ulcer patient belongs to the asthenic type originally described by Goldthwait.[14] He has often been described as a thin, lanky, narrow-chested individual with a "lean and hungry" look—driving, ambitious, emotional and tense. The psychic make-up accompanying these physical characteristics tends to determine the choice of occupation, with the result that certain professions and trades such as engineering, law and surgery, are particularly ulcer-prone.

There are, however, quite a number of ulcer patients who do not fall into this main group. These individuals belong more to the sthenic type. They may exhibit a most deceptive external calm and seem to keep their nervous stress hidden well beneath the surface. It is interesting, as Moore[15] points out, that this type of individual tends to suffer from ulcers which bleed rather than from typical ulcer pain To whichever type the ulcer patient belongs, he shows the same reaction toward his environment Most intelligent patients can correlate definite exacerbations of their symptoms with such events as prolonged nervous stress, fatigue, overwork or irregular meal hours, and it is therefore apparent that the *true cause of the ulcer diathesis lies in the psychological type of the individual and not in his physical build*

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* A Hunterian Lecture delivered at The Royal College of Surgeons of England, February 3, 1948.

Experimental Evidence: The experimental evidence in support of this hypothesis is as follows Cushing[16] first demonstrated the existence of a definite nerve tract between the vagal centers and the cerebral cortex He showed that any irritative lesion along this tract gave rise to ulceration of the stomach or duodenum, and that stimulation of the vagal center or the cortical end of the tract produced the same result This important work was overlooked for some years and its full implications have only recently been realized The result of vagal stimulation is to produce hypersecretion of gastric juice and increased peristalsis, which itself probably increases the gastric secretion by a physical milking effect on the glands

Pavlov[17] was the first to show the presence of the psychic component of gastric secretion and he believed it to be limited to the early stage of gastric digestion Carlson[18] in 1923 showed this neurogenic secretion to be present more or less continuously, although to a lesser degree than during actual digestion Dragstedt[19] found that it occurred even during sleep in the typical ulcer patient, and that it was accentuated in emotional states or nervous stress Stahnke[20] in 1924 produced ulcers in experimental dogs as the result of *hyperacidity from electrical stimulation of* the vagi Hartzell[21] showed that section of the vagi stopped this abnormal flow of gastric juice but that the effect was not permanent if section was incomplete

Beaver and Mann[22] using a Mann Williamson[23] physiological gastroenterostomy in experimental dogs demonstrated that the only cases which escaped ulcer formation were those in which an accompanying vagal section had also been performed Wolf and Wolff[24] observing a laboratory attendant with a large gastrostomy, showed that ulceration of the exposed mucosa could be produced by gastric hypersecretion secondary to psychological effects such as worry The chain of evidence is thus complete It becomes apparent that the main underlying cause in the development of chronic ulcer is the hypersecretion resulting from psychological stimulation of the vagi

REVIEW OF PAST PHYSIOLOGICAL SURGERY

It is now necessary to give a short review of the previous attempts at physiological surgery in peptic ulcer in order to show the basis on which the modern operation of vagotomy rests

Gastroenterostomy Gastroenterostomy, introduced by Wolfler in 1881, constituted for many years the routine surgical treatment of ulcer It was originally designed to deal with pyloric stenosis of either organic or spasmodic type, and it owed its rise in popularity to its apparent physiological basis The ulcer could be rested and it was believed that the provision for entrance of bile into the stomach would reduce the gastric acidity Unfortunately however this was found not to be so, and we are all aware of the long term disasters in the nature of secondary ulceration which eventually brought about the downfall of this procedure

The operations of pyloroplasty and gastroduodenostomy were attempts along the same lines *to deal with the particular problem of* parapyloric ulcer, but they are technically more difficult and therefore carry a higher operative mortality Moreover, although free from the later complications of anastomatic or jejunal ulceration, they were not entirely successful in preventing secondary gastric ulcer These methods of treatment eventually became confined to special types of case and surgical opinion became focused on the relatively new procedure of gastrectomy as a possible alternative

Subtotal Gastrectomy: It was soon apparent that standard gastrectomies of the Bilroth Shoemaker and Pauchet type were relatively valueless in dealing with gastroduodenal ulcer These operations were designed either to remove the ulcer bearing portion of the bowel paralyzed stomach recovers its power of movement—accompanied of course by intravenous feeding. Breathing exercises are instituted after the first few hours and early ambulation is employed, most cases being out of bed within 72 hours. As soon as suction is discontinued a rapidly increasing postoperative diet is given, so that by the end of six days it is up to a normal third-week Meulengracht diet. Patients are sent out of hospital on this diet, with instructions to remain strictly on it until later review. Some of the American surgeons start normal diet immediately, but I feel that this is somewhat dangerous and that it should not be allowed until there is definite evidence that the ulcer has healed.

At the end of three months all cases are reviewed again in hospital. The barium meal is repeated and almost always shows complete healing of the lesion. Another fractional test meal is performed and the night fasting juice secretion again investigated. As a final precaution an insulin test meal is carried out on every case. The method employed is that described by Hollander.[42] The patient is given 20 units of insulin intravenously and a blood sugar test made one-half hour later. If the reading is below 45 mgms— an ordinary fractional meal estimation is carried out. The rationale of this test depends on the fact, first demonstrated by Roholm,[43] that excessive gastric secretion takes place during hypoglycaemia. Okada[44] and La Barre[45] demonstrated that this secretion was abolished following vagotomy and after the administration of atropine, and the insulin test meal therefore supplies definite proof whether vagotomy has
been complete. In a normal person, or
branches of the vagus have been mi
operation, the response to insulin h
cemia is very marked but it is alm
existent following complete vagotomy.

Figure 3 shows the typical variation
insulin test mea before and
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RESUL

Physiological Se ric.
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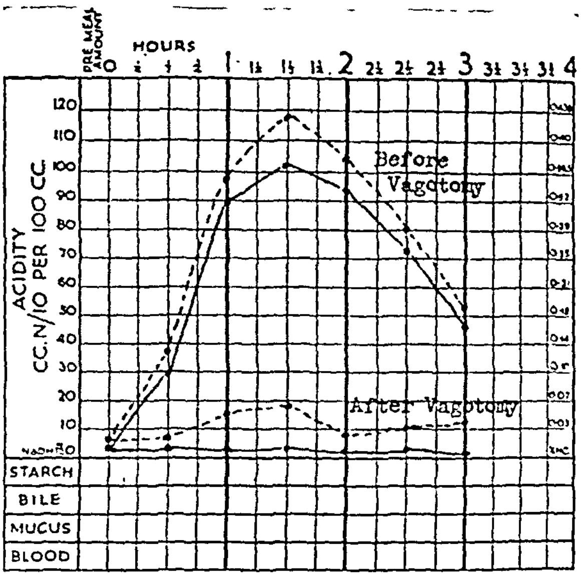

THE INSULIN TEST MEAL CURVE

Fig. 3

effects are temporary paralysis of the stomach and complete relief of ulcer pain. The gastric paralysis was first described by Klee[46,47,48,49] and Exner and Schwarzmann[26,27] and is the natural result of division of the main motor nerves. Carlson[50] and McCrea,[38,51] in their investigations into the functions of the gastric nerve supply, found that the vagus is solely responsible for the control of peristalsis, through its influence on Meissner's and Auerbach's plexuses. They showed that the sympathetic is not an opponent nerve supply except in sphincteric control, and that its sole motor function is maintenance of muscle tone.

The relief of pain following vagotomy, which is so marked a feature, is more difficult to explain. Bentley and Smithwick's[52] work
t the sympathetic is the main path-
ry stimuli fr most of the ab-
Iesser's[5] riments on the
ved vagus does
sympa-
. This
re,[54]
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strong peristaltic contractions and muscle spasm.

It is because of this temporary paralysis of the stomach that postoperative gastric suction is necessary. Table 4 shows the period for which it was required in my series of cases and the average quantity of fluid withdrawn. Despite the variation in vagal tone preoperatively *it is interesting that there is no* essential difference between the degree of immediate paralysis in gastric or duodenal ulcer. Also that the severity of this paralysis apparently bears little relationship to the extent of the later retention symptoms

TABLE 4

Postoperative Gastric Suction

Period Required
58.7 percent required suction for 36 hours or more
(*Average period* 32.6 hours)

Volume of Fluid Withdrawn
100 cc. or less 38%
2,000 cc. or more 10%
(*Average volume*=610cc.)

NOTE:
1 No apparent difference between types of ulcer.
2 No similarity between degree of postoperative paralysis and later retention symptoms.

The delayed effects of vagal section are of equal importance. Recovery from the temporary paralysis takes place within 24 to 72 hours of operation and peristalsis gradually *increases in frequency and amplitude, though* it probably never returns to the degree to which it was present previously. Moore[54], and Hesser and Baylin[56] have investigated the subject extensively from this aspect. Most of my own cases showed considerable delay in gastric emptying three months postoperatively, to which I shall refer again later. Associated with the gradual return to normal of peristaltic activity there is an increase in muscle tone, which Hesser and Baylin[56] have shown may reach two to three times its preoperative strength within the succeeding three years Curiously enough, this is often accompanied by temporary gastric dilatation and ptosis—the result of pylorospasm from the unopposed action of the sympathetic. Maybe some months will elapse before the stomach regains its normal size and position, and some believe that it never completely does so. Rundles and Baylin[57] have shown that these alterations in muscle tone and movement are not confined to the stomach but also involve the duodenum and jejunum, though to a lesser extent. But according to Moore[54], no *other organs supplied by the vagus appear* to show any alterations of function. Dr. Forbes-Lawson[58] tells me that it is more difficult at x-ray examinations to express the barium from the stomach into the duodenum after vagotomy, and Moore[54] has shown that the initial emptying time after vagotomy is considerably lengthened.

Both the total volume and free acidity of the gastric secretion are permanently reduced after vagotomy. Thornton[59] and Grimson[60] have both drawn attention to these changes in the night fasting juice, which are similar to those previously described by Hartzell[21] in the fractional test meal. My own work confirms both these observations

Figures 4 and 5 show the average fractional meal curve of 40 cases of duodenal ulcer. before and after vagotomy. It will be noticed that the free hydrochloric acid secreted postoperatively is only a third of the preoperative quantity. Table 5 gives the equivalent values for the night fasting juice estimation.

Pfeiffer[61] demonstrated in dogs that there is also a temporary drop in the blood calcium after vagotomy, and Moore[54] has confirmed that this occurs in the human subject. This fall is probably *analagous to that which takes* place in gastric tetany, as the result of stasis and alkalosis It is due, I think, to the gastric retention which takes place.

Personal Results: In company with other surgeons performing vagotomy, I have found it to give excellent results in properly selected cases Two of my earlier transthoracic operations gave evidence of incomplete neurectomy at subsequent insulin test meal and both patients were eventually reoperated on using the abdominal approach In each, a large vagal trunk was found subdiaphragmatically and was divided. Both gave good results afterwards. Every case in which vagal section has been complete has shown *immediate and entire* relief of ulcer symptoms, together with

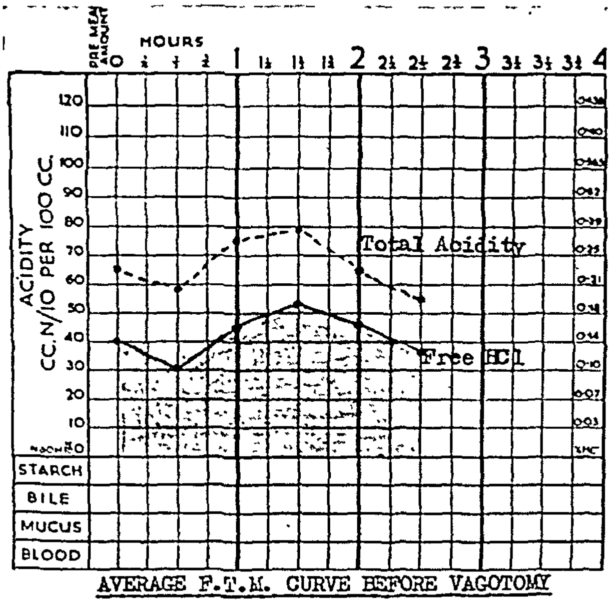


Fig. 4. Forty cases with duodenal ulcer.

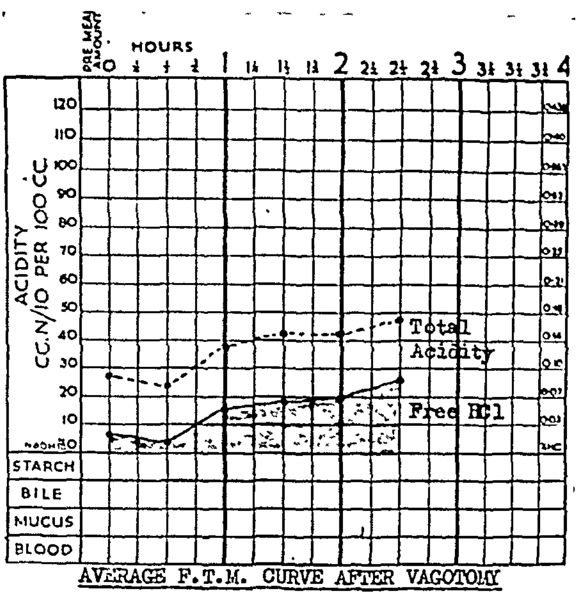


Fig. 5. Same 40 cases as shown in Fig. 4.

radiological evidence of healing within four months. With the exception of the two psychotic patients previously mentioned, they have all returned to full economic life and normal diet. I found that there has been a rapid increase in weight in over 85 per cent of my cases, which is noticeably favorable compared with the usual slow regain after gastrectomy. It has been interesting to watch the psychological reaction of the patients after operation. Over 60 per cent of them returned voluntarily to work before coming up for review three months later, and they are all most enthusiastic over the results.

TABLE 5

Night Fasting Juice

Average result in 40 cases of duodenal ulcer.

Before Vagotomy	*ccs per hour*
Total secretion	67.3
Total acidity (as N/10 NaOH)	49.7
Free HCl (as N/10 NaOH)	32.2
After Vagotomy	
Total secretion	37.0
Total acidity (as N/10 NaOH)	24.8
Free HCl (as N/10 NaOH)	4.7

One death occurred in my series of cases but this gives a misleading idea of the operative mortality. The man concerned died from hemorrhage 10 days after operation and was found at postmortem examination to have bled from a large aneurysmal dilatation of the right gastric artery, which chanced to lie immediately under the ulcer crater. During his five years history of ulcer symptoms there had not been any suggestion of previous hemorrhages. Other surgeons have also found the operative mortality in uncomplicated cases to be extremely low.

The only serious postoperative sequela has been the occasional development of chest complications. I have recently come to the conclusion that the type of anaesthetic employed is the factor mainly responsible and have had less trouble since curare and ether was substituted for the previous combination of curare and cyclopropane. These chest complications are, of course, much more liable to occur after the transthoracic procedure.

The only unpleasant symptoms in my own series after operation have been those due to the temporary gastric retention. The majority of cases show at least a six-hour gastric delay four months later, although this has usually largely disappeared by the end of the first year. Associated with it is a feeling of distension after food, particularly if too much is

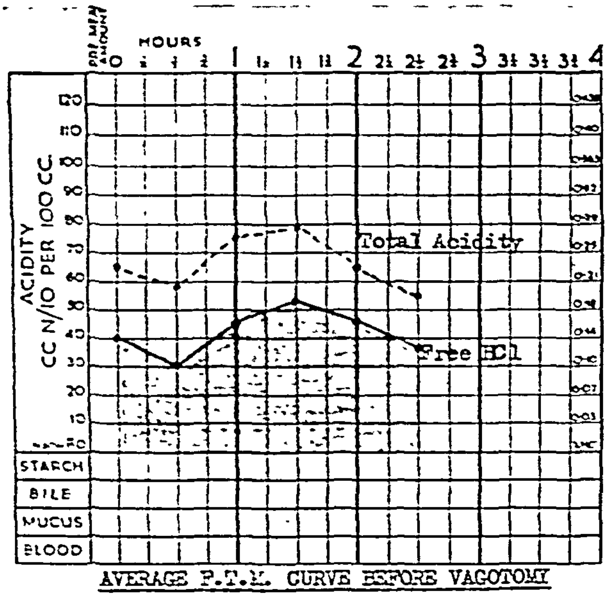
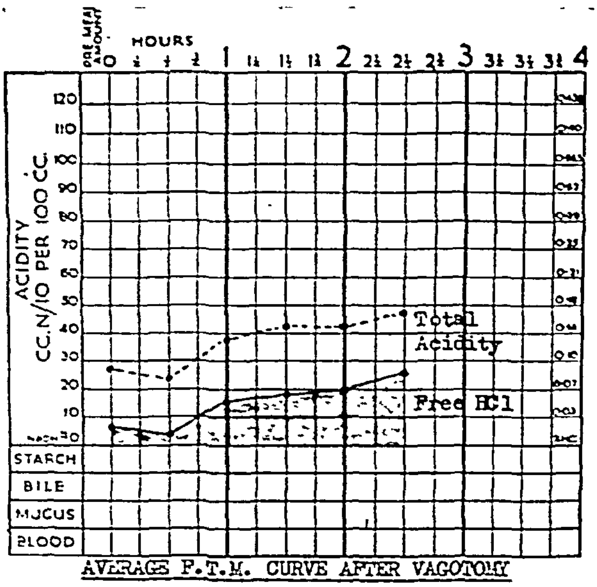


Fig. 4. Forty cases with duodenal ulcer.



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qu'avec le temps, des médicaments appropriés seront trouvés qui contrôleront la vagotomie qui est la cause de l'ulcere cancéreux Mais avant que cela arrive le traitement chirurgical de l'ulcere peptique chronique continuera à être la méthode de choix et il faut reconnaître que la vagotomie donne les plus grands succès dans les cas choisis Un excès d'enthousiasme dans n'importe quel procédé chirurgical récent peut entraîner des echecs inutiles qui diminuent la vraie valeur du procédé Il importe que céla ne survienne pas dans la vagotomie Tout cas doit être étudie postopératrvement, du point de vue de l'évaluation du jus gastrique résultant de jeûne nocturne et aussi de l'épreuve du repas d'ipsuline, afin de s'assurer si la neurectomie a été complete Ce n'est qu'avec ces renseignements qu'il est possible d'évaluer les résultats ultimes

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no proven recurrences have yet been reported following its use.

CONCLUSIONS

In conclusion, I am convinced that vagotomy constitutes a great surgical advance in the treatment of peptic ulceration. It is not the final solution, for I believe with Dragstedt that control of the ulcer diathesis is essentially a medical and an economic problem. It does not seem beyond the limits of reasonable possibility that suitable drugs will eventually be developed to control the vagotonia which is the cause of the ulcer diathesis. But until that stage is reached, surgical treatment of chronic peptic ulcer must continue to be the method of choice, with vagotomy as the most successful approach in selected cases.

It is obvious, moreover, that considerable further research is necessary into the detailed anatomy and physiology of the gastrointestinal tract. The gaps in our knowledge of these subjects only become apparent when the problem of such procedures as vagotomy require elucidation.

You will notice that I have not referred at all in this lecture to the end-results of vagotomy. Dragstedt's original cases have now been followed up for over five years and are still giving satisfactory results but, with the lesson of gastroenterostomy before us, it would be foolish to assume permanency of cure until a large number of cases have been carefully followed for at least 10 years.

I should like to end on another note of warning. Overenthusiasm in any recent surgical advance is apt to produce unnecessary failures, which detract from the true value of the proceeding. It is most important that this should not occur in vagotomy. Every case must be checked postoperatively, both by estimation of the night fasting juice and by the insulin test meal, to ensure that neurectomy has been complete. Only in the light of this knowledge is it possible to assess the ultimate results

RIASSUNTO

L'Aritiene che la vagotomia segni un notevole progresso nella cura delle ulceri peptiche. Non rappresenta tuttavia la soluzione definitiva, perchè il controllo della diatesi ulcerativa involve un problema fondamentalmente medico ed economico. Ammettendo che la vagotonia sia la causa della diatesi ulcerativa, si puo' sperare nella scoperta di medicine atte a controllare questa distonia nervosa. Fino allora la cura chirurgica delle ulcere peptiche cronicizzate rimarra' il metodo di elezione, con la vagotomia riservata a casi ben selezionati. L'Arichiama infine l' attenzione sopra l'opportunità di frenare entusiasmi eccessivi, che andrebbero a tutto detrimento della vagotomia. Per giungere a conclusioni precise, occorre che ogni caso sottoposto alla resezione dei vaghi venga controllato per un lungo periodo di tempo. Onde stabilire se la resezione e' stata completa, occorre inoltre esaminare in tutti i casi il succo gastrico a digiuno, e fare appello alla prova dell'insulina.

SUMARIO

La vagotomia es un procedimiento de gran valor en el tratamiento quirurjico de la ulcera peptica, pero no ofrece la solucion final de este problema; por esta razon el autor opina con Dragsted que el control de esta diatesia ulcerativa es un problema medico y economico. Segun el, hay la posibilidad de que con el tiempo se descubriran drogas efectivas en el control de la vagotonia responsable por esta diatesia. Mientras tanto la cirujia es el tratamiento de seleccion; siendo la vagotomia el metodo de mas valor en casos seleccionados.

El abuso de la vagotomia, sin embargo, acarreara muchos fracasos que conduciran al descredito de este procedimiento de valor. Por lo tanto todos los casos operados por este procedimiento deben de ser examinados cuidadosamente y deben de someterce al analisis gastrico en ayunas y por el metodo de la insulina, pues solo asi podemos estar seguros de que la neurectomia (vagotomia) ha sido completa. Lo cual es esencial en la determinacion del valor de este procedimiento.

SOMMAIRE

L'auteur est convaincu que la vagotomie constitue un grand progrès dans le traitement des ulcérations peptiques; mais ce n'est pas la solution finale, car il croit avec Dragstedt que le contrôle de la diathèse ulcéreuse est essentiellement un problème medical et économique. Il n'est pas irraisonnable de croire occur in early adult life must never be forgotten

Etiology It is not within this article's scope to discuss in detail either the pathology or etiology of cancer of the rectum the real origin of which like carcinoma elsewhere remains obscure It may be said however that in all probability carcinoma of the rectum does not develop from simple rectal lesions such as hemorrhoids anal fissure fistula in ano and benign rectal stricture It is also unlikely that constipation predisposes to carcinoma of the colon and rectum since constipation is distinctly more common in women than in men whereas carcinoma occurs twice as frequently in men

Single or multiple adenomata of the large intestine are without doubt closely related to the development of carcinoma in the large bowel and may precede it in nearly all instances Indeed no less an authority than Lockhart Mummery believes that adenoma of the rectum is merely a stage in the development of malignant disease in that organ He regards a simple adenoma as a definitely precancerous condition and recommends most strongly that on no account should a simple adenoma of the rectum be allowed to remain even if it is causing no troublesome symptoms it should be freely removed With this view all competent authorities are in full agreement and recommend that single or multiple adenomata in any portion of the colon should always be regarded as premalignant and be extirpated no matter how simple they appear on histological examination of a biopsy specimen When several adenomata are present they may each be the starting point of a separate cancer two or more cancers being present in approximately four percent of persons with carcinoma of the large intestine*

When fully developed carcinoma of the rectum exhibits two important histological cell types—columnar-celled adenocarcinoma and squamous epithelioma Adenocarcinomata comprise approximately 96 percent of all rectal carcinomas and occur proximal to the anorectal line Squamous epithelioma is much less common only from three to six percent of all rectal and anal malignant tumors being of this type* *

The gross appearances presented by adenocarcinomata of the rectum and rectosigmoid vary widely but may be roughly divided into four varieties nodular scirrhus colloid and papillary

1 *The Nodular Carcinoma* projects into the lumen and tends to encircle the bowel Ulceration is common and occasionally the tumor may be of large size encephaloid in appearance and bleed freely from its ulcerated surface Fibrous tissue is usually plentiful and as a rule the tumor mass is hard Partial obstruction is common as a result of inflammation and contraction of the stroma It is the most common variety encountered and may be met with in both the colon and rectum

2 *The Scirrhus Cancer* is usually small and very hard fibrous tissue elements being greatly in excess of epithelial The tumor appears to encircle the bowel as though a knot had been tied around it giving rise to the well known napkin ring like appearance It is a potent cause of intestinal obstruction occurs most frequently in the left colon and is rare in the rectum

3 *The Colloid or Mucoid* variety presents a glistening appearance which is frequently not universal throughout the tumor It is uncommon only five percent of all adenocarcinomata of the large bowel being of this type It occurs both in the rectum and rectosigmoid and is often ulcerated It does not usually give rise to obstruction

4 *The Papillary Carcinoma* is usually found in the left colon but may occur in the rectum It resembles a large papilloma or warty excrescence It does not commonly cause obstruction

Epitheliomata occur almost exclusively at the anus and may either present a raised warty appearance frequently superficially ulcerated or a flat ulcer of irregular surface and little or no marginal elevation The tumors may be very small and closely resemble a fissure or they may be very extensive and involve nearly the entire circumference of the anus Their most important characteristic is their induration when felt between the fingers They rarely give rise to mechanical obstruction but are often the cause of very severe pain during defecation

Methods of Spread Cancer spreads and disseminates in three ways 1 by direct invasion

Carcinoma of the Rectum and Sigmoid Colon—Diagnosis and Treatment

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TODAY, in all civilized countries, an increasing interest is being taken in the problems of cancer detection and treatment. This is largely the result of its rise in importance as a cause of death from seventh place in 1900 to second place at the present time. It is also becoming more generally appreciated, both by the public and the medical profession, that cancer in its early stages is now a curable disease if only it can be diagnosed and treated before dissemination has taken place. Its timely detection and treatment is therefore one of the most important obligations of our profession to humanity.

Incidence: The gastrointestinal tract is the most frequent site of cancer in humans. In 1940, 46 percent of all deaths attributable to cancer in the United States originated in the gastrointestinal tract,[1] the stomach being the organ most frequently involved and responsible for 16.5 percent of all deaths from cancer. Malignant neoplasms of the colon caused about 11 percent of cancer deaths and those of the rectum and anus nearly six percent. Therefore, the large bowel is as frequent a site of fatal malignant tumors as the stomach and when it is remembered that in the United States approximately 27,000 deaths, and in Canada probably about 2,100 deaths, are caused every year by malignant disease of the large intestine, the dimensions of the problem will be appreciated.[2]

Site of Malignant Tumors of the Large Bowel: The reported frequency of carcinoma in different segments of the colon varies considerably. Hurst, who combined the figure given by many British, American, and Continental surgeons, submitted the following table which probably accurately represents the incidence of cancer in the various portions of the colon.

TABLE 1

Percentage Incidence of Carcinoma in Different Parts of the Colon

	Large Intestine, Excluding Rectum	Rectum Excluding Rest of Large Intestine	Whole of Colon Including Rectum
Cecum	15		
Ascending Colon	10		
Hepatic Flexure	5		
Transverse Colon	5		25
Splenic Flexure	10		
Descending and Iliac Colon	5		
Pelvic Colon	50		25
Pelvi-Rectal Flexure		65	
Ampulla of Rectum		30	50
Anal Canal		5	
Total	100	100	100

It is immediately evident from a study of Table 1 that the majority (75 percent) of malignant neoplasms of the large bowel arise in the rectum and sigmoid colon, that is in the last 10 inches of the colon, a portion of the large intestine almost wholly accessible to the palpating finger or sigmoidoscope.

Age, Race, and Sex Incidence: Carcinoma of the rectum and sigmoid colon occurs at any age in all races and in both sexes, males being more frequently affected than females in the proportion approximately 2 to 1. The most common decade for rectal cancer is 55 to 65 but it is not uncommon to find the disease in adolescents and young adults. For example, in Bacon's[4] series of 1,995 cases, there were 109 cases of rectal cancer between the ages of 10 and 30, an incidence of 5.4 percent. These youthful cases, as is usual in cancer in young persons, very frequently have a short history, a high incidence of inoperable growths with metastases, and few three and five year survivals. Very early diagnosis is therefore essential in these cases if cure is to be achieved and the fact that carcinoma of the rectum may

TABLE 2

Diagnosis of Carcinoma of the Colon and Rectum Procedure necessary for Diagnosis:

(1) Painstaking anamnesis.
(2) Complete physical examination.
(3) Digital examination of the rectum.
  a. Right lateral position.
  b. Knee chest position.
(4) Proctoscopy and sigmoidoscopy. If a tumor is seen the following features should be noted:
  a. The exact position of the growth on the circumference of the rectum.
  b. The distance of the lowest edge from the anorectal line.
  c. Its physical structure, whether ulcerated, papillary, or bulky and mucoid.
  d. Whether the tumor is movable or fixed to surrounding structures.
  e. A generous specimen should be taken from the periphery for histological examination.
(5) X-ray examination.
  a. Flat plate of the abdomen.
  b. Opaque enema.
  c. Contrast enema
  d. Routine diagnostic films of the chest.
  e. Excretion urograms of the renal tract.

bleeding that impels the patient to seek advice. It is after all the symptom which points the finger to the possible cause, the cloud no bigger than a man's hand which warns of the storm to come. Only by most careful study can a true appreciation of the patient's past and present health and the probable cause for his present symptoms be determined.

Malignant disease of the rectum and sigmoid colon should be suspected whenever a patient over 20 years of age complains of the following:

(1) A recent change in bowel habit such as constipation, diarrhea, or the passage of an unusual quantity of flatus from the bowel.
(2) Bleeding from the rectum, especially with each act of defecation.
(3) Abdominal discomfort, soreness, or pain related to the act of defecation.
(4) Gradually developing abdominal distension and peristaltic unrest.
(5) Loss of weight and strength or progressive anemia which cannot otherwise be explained.
(6) Attacks of partial intestinal obstruction or the sudden onset of obstipation, for which no obvious cause, such as an obstructed hernia, is present.
(7) An abdominal mass

In the presence of any of these symptoms or signs a complete examination should be made at once and the patient's physical status appraised.

The digital examination of the rectum should then be done. Two positions are commonly employed: (a) The left or right lateral position, (b) The knee chest position.

There is no doubt that the right lateral position is preferred because in the knee chest position many comparatively low growths, which are still movable, drop out of the pelvis and may, in consequence, not be reached by the palpating finger. The knee chest position is also far from comfortable for the patient and it is undignified and much resented by women The position of choice is therefore the right lateral position It allows the patient to relax in comfort during the examination and enables the examiner, as Abel[12] has pointed out, to reach higher into the pelvis than in any other position. Growths even eight to 10 inches from the anus may be quite easily felt.

The examination must be conducted deliberately and carefully. The patient should be told that the finger will be inserted into the rectum and reassured that there will be little discomfort if he relaxes completely. The buttocks are then separated, and the anus carefully inspected and any abnormal features noted A liberal quantity of lubricant should then be gently massaged into the anus and about its margins so that the finger will slip into the rectum with as little friction as possible. If the external anal sphincter is spastic because of the presence of a fissure or inflamed from persistent tenesmus, an anesthetic ointment such as nupercainal should be used beforehand.

Once inserted, the finger palpates the anal canal and the presence or absence of rough areas, pits, or ulcers, is noted. If an ulcer suggestive of carcinoma is felt, its position, dimensions, and fixity are determined. The of adjacent tissues—spread by continuity; 2. by the blood stream to distant organs, such as the liver; 3. by invasion of lymphatic vessels and lymph nodes with subsequent permeation and embolism to more distant sites.

(1) Cancers of the rectum and rectosigmoid usually grow slowly. At an early stage the tumor is limited to the mucous and submucous layers, grows at right angles to the long axis of the bowel, and shows little tendency to spread longitudinally. It gradually infiltrates the muscular coats of the bowel and finally erupts through the serosa and invades the surrounding tissues or becomes widely disseminated throughout the peritoneal cavity.

(2) Hematogenous spread may take place at any stage of the disease and approximately 15 percent of cases of rectal carcinoma presents this unfavorable feature at the time of operation.[9, 10] The organ most frequently invaded is the liver.

(3) Invasion of the lymphatic vessels and nodes is undoubtedly the most important method of spread and it may occur at any time after a malignant lesion has penetrated to the submucosa, being demonstrable in from 65 to 70 percent of cases of carcinoma of the rectum and sigmoid.[9] Epitheliomas in the anal region likewise metastasize early to inguinal and pelvic lymph nodes. The incidence of lymphatic spread in carcinoma of the rectum is thus considerable and Coller and his coworkers have emphasized certain important features which deserve special mention.[9, 10]

1. The age of the patient exerts no important influence upon the frequency of metastases.
2. There is no relationship between the duration of symptoms and the occurrence of metastases.
3. There is no correlation between the size of the primary tumor and the presence of metastases.
4. The more malignant the tumor the more likelihood is there of lymph and blood borne metastases.
5. Low lying tumors may metastasize very high.
6. Retrograde spread and interrupted spread may occur with normal nodes intervening between the primary site and the next involved node.
7. Metastasis is more frequent when lesions are of very short symptomatic duration.

The Diagnosis of Carcinoma of the Rectum: Diagnosis is a necessary preliminary to intelligent therapy and in cancer, almost more than in any other disease, early diagnosis is essential for successful treatment. It is therefore especially unfortunate that carcinoma of the rectum in its early stages is not characterized by any distinctive symptoms and may even be completely silent in from two to three percent of cases. Indeed the disturbance of bowel function is frequently at first so trivial and apparently unimportant that it may be completely disregarded by the patient and his doctor for many months.

There are many reasons for this apparent neglect. Undoubtedly, the most potent is the prevalence of relatively benign bowel disorders which manifest themselves by constipation, diarrhea, and bleeding from the anus. These same three symptoms—constipation, diarrhea, and bleeding, are also common danger signals of a cancer of the bowel. Thus a patient who presents these three symptoms may have a simple lesion, but he may have a cancer. The wise physician will carefully eliminate cancer in all patients with recurrent or persistent constipation, diarrhea, or bleeding from the anus.

It is thus evident that much difficulty may be encountered in making an early diagnosis of cancer of the rectum and rectosigmoid from the history alone. Fortunately auxiliary and comparatively exact methods of diagnosis are available which reduce the margin of error very substantially. They include: digital examination of the rectum; proctoscopy and sigmoidoscopy; and x-ray examination of the lower colon by the opaque enema. They should all be used whenever there is any possibility of a cancerous lesion being present.

The procedures which are essential for the early diagnosis of cancer of the rectum are enumerated in Table 2.

Anamnesis: There is no doubt that since the introduction of comparatively exact laboratory and radiological aids to diagnosis, inquiry into patients' histories has become less painstaking. Yet it is some derangement of function and the development of a symptom such as

TABLE 2

Diagnosis of Carcinoma of the Colon and Rectum
Procedure necessary for Diagnosis:

(1) Painstaking anamnesis.
(2) Complete physical examination.
(3) Digital examination of the rectum.
  a. Right lateral position.
  b. Knee chest position.
(4) Proctoscopy and sigmoidoscopy. If a tumor is seen the following features should be noted:
  a. The exact position of the growth on the circumference of the rectum.
  b. The distance of the lowest edge from the anorectal line.
  c. Its physical structure, whether ulcerated, papillary, or bulky and mucoid.
  d. Whether the tumor is movable or fixed to surrounding structures.
  e. A generous specimen should be taken from the periphery for histological examination.
(5) X-ray examination.
  a. Flat plate of the abdomen.
  b. Opaque enema.
  c. Contrast enema.
  d. Routine diagnostic films of the chest.
  e. Excretion urograms of the renal tract.

bleeding that impels the patient to seek advice. It is after all the symptom which points the finger to the possible cause, the cloud no bigger than a man's hand which warns of the storm to come. Only by most careful study can a true appreciation of the patient's past and present health and the probable cause for his present symptoms be determined

Malignant disease of the rectum and sigmoid colon should be suspected whenever a patient over 20 years of age complains of the following:

(1) A recent change in bowel habit such as constipation, diarrhea, or the passage of an unusual quantity of flatus from the bowel.
(2) Bleeding from the rectum, especially with each act of defecation.
(3) Abdominal discomfort, soreness, or pain related to the act of defecation.
(4) Gradually developing abdominal distension and peristaltic unrest.
(5) Loss of weight and strength or progressive anemia which cannot otherwise be explained.
(6) Attacks of partial intestinal obstruction or the sudden onset of obstipation, for which no obvious cause, such as an obstructed hernia, is present.
(7) An abdominal mass.

In the presence of any of these symptoms or signs a complete examination should be made at once and the patient's physical status appraised.

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Once inserted, the finger palpates the anal canal and the presence or absence of rough areas, pits, or ulcers, is noted. If an ulcer suggestive of carcinoma is felt, its position, dimensions, and fixity are determined. The finger is then inserted into the rectum proper and carefully swept round its walls.

A wide variety of lesions may be encountered. A fecal impaction feels firm, is circular or oval in shape and frequently may be indented like putty. Adenomata are usually elusive, soft and attached. Villous tumors are soft and difficult to delimit accurately. Carcinomas feel craggy, nodular, and hard. They often have a raised, indurated edge, and frequently a central crater. The portion of the rectum which they occupy may be mobile or firmly fixed to surrounding pelvic structures. Extra rectal structures should be carefully sought. In men, the prostate and seminal vessels are usually readily felt and in women the cervix is a prominent feature in front of the anterior rectal wall. Posteriorly, enlarged glands and thickened lymphatics may sometimes be felt in the mesorectum. In both sexes the possibility of secondary malignant deposits from a carcinoma elsewhere in the abdomen should be remembered.

Proctoscopy and Sigmoidoscopy: No special preparations or anesthetic is usually required for the examination, which can frequently be done as an office procedure. Preliminary enemata are undesirable because very often part of the enema fluid is retained; also, if fecal material is present in the rectum, it can generally be picked out or swabbed out through the proctoscope or sigmoidoscope. If the rectum is loaded with feces and the examination is consequently impossible to complete satisfactorily the patient should be admitted to hospital and a cleansing enema of two quarts of warm water (110° F) should be given about six hours before the time of the proposed examination.

Proctoscopy and sigmoidoscopy can be performed with the patient in the right lateral position. The best position, however, is the so-called knee shoulder position. In this the patient kneels and rests his left shoulder and left side of his face on the table. His thighs should be vertical with the knees slightly separated and his back should be straight and not arched.

During proctosigmoidoscopy the following features should be most carefully noted: (1) [illegible] of [illegible] in the bowel and whether [illegible] pus, or mucous present; (2) [illegible] hemorrhoids, fibrous polyps, or hypertrophied anal papillae; (4) the dimensions of the lumen of the rectum, whether normal, ballooned, or contracted; (5) the appearances of the mucous membrane, whether pale and smooth, or inflamed and granular with a tendency to bleed; (6) the presence of any stricture of the rectum or spasm at the rectosigmoid junction; and (7) the size and site of epithelial tumors such as adenomata or carcinoma. If such a tumor is discovered and it is thought to be benign it should be removed with a diathermy snare and examined histologically. If it is probably carcinomatous a biopsy should be taken from its edge.

Reexamination: If for any reason the examination has been unsatisfactory, either because the patient was nervous and intolerant of the procedure, or because the rectum was loaded with feces, proctosigmoidoscopy must be repeated, if necessary under anaesthesia, after an interval of two or three days. In the interval the bowel should be carefully cleansed and any painful condition of the anus relieved. Reexamination is especially necessary in cases with symptoms suggesting the presence of carcinoma and there can be few surgeons who have not had the bitter experience of missing an early carcinoma situated just above a valve of Houston, which on reexamination, often much later, was easily seen.

Clinical Features of Carcinoma of the Rectum and Rectosigmoid: There are a number of factors which influence the production of symptoms from carcinoma of the rectum:

(1) The feces which pass through the rectum are semi-solid or solid. Vascular and friable tumors are consequently often abraded and bleeding at defecation is thus an extremely common sign of a rectal tumor.

(2) If a stenosing carcinoma is present, partial or complete obstruction is liable to occur.

(3) The carcinomas which occur in the rectum are commonly friable, vascular cancers with a large central ulcer heavily infected by intestinal organisms. A constant flux of serosanguinous secretions seeps from the growth and accumulates in the rectum to be passed subsequently in a form which the patient describes as diarrhoea.

(4) The main function of the rectum is

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blood transfusions and the exhibition of iron and liver concentrates are vitally important to the preparation of all these patients for operation and no elective procedures for the eradication of a rectal cancer should be undertaken if the hemoglobin concentration is below 80 percent

3 Restoration to normal of the water and electrolyte equilibria of the body

4 Many patients with carcinoma of the colon develop subclinical vitamin deficiency states, which may most adversely affect healing and the whole postoperative course A high vitamin intake is therefore essential during the period of preparation, especially of vitamin C, and it is our practice to give 1,000 mg of ascorbic acid per day in the preoperative period

5 *Associated Disease* The majority of patients with carcinoma of the colon are no longer young A close investigation of the *respiratory, cardiovascular, and renal systems* is thus necessary before surgery is undertaken If the patient is found on investigation to be a diabetic this disease will require most careful control throughout the whole pre and postoperative periods

The Preparation of the Colon It is now universally agreed that before a major resection of the colon is undertaken two conditions must be fulfilled (1) The colon itself must have been rendered as nearly as possible sterile, (2) Obstruction must have been completely overcome

Sterilization of the Colon Previous to 1940 comparative sterilization of the colon was only accomplished with difficulty and uncertainty No powerful antibacterial drugs with an important action upon intestinal organisms were available Mechanical methods, notable among which was Sir Hugh Devine's method of "defunctioning" the distal colon, were therefore employed to divert the fecal stream and the Augean distal colon was thereafter irrigated by the Alpheus like irrigating enema With the introduction of sulphaguanidine, and more recently of succinyl sulphathiazole, sulphathalidine, and streptomycin which are even more potent intestinal antibacterial drugs, it became possible to reduce the bacterial count of the large intestine to negligible proportions As a result the colon now can be operated upon with comparative freedom from the risk of peritoneal infection, open meticulous placement of sutures is permissible and the colon itself, freed from the incubus of hostile bacteria heals kindly and quickly

Obstruction. From the standpoint of obstruction patients with carcinoma of the rectum may be divided into three groups (1) those without obstruction, (2) those with chronic obstruction, (3) those with acute obstruction

The patient without obstruction is indeed fortunate For him his general preparation by dietetic and other measures progresses unhindered and unchecked He can immediately be given a 5,000 calorie high protein high carbohydrate low residue diet rich in vitamins A gentle laxative, such as senna, with one ounce of mineral oil twice a day, promotes complete evacuation and his colon can at the same time be made relatively aseptic by the *administration of two grams of* sulphasuxidine four times a day for 7 to 10 days Anemia and hypoproteinemia should be overcome by blood transfusions in suitable amounts If there is evidence of perirectal *infection such as tenderness, fixity and an* elevated temperature and white blood cell count, 50,000 units of penicillin should be given intramuscularly every three hours Ambulation should be insisted upon and deep breathing exercises should also be carried out every day After 7 to 10 days of such treatment both the patient himself and his colon are usually fit and ready for surgery and both he and his surgeon are able to look forward with reasonable assurance to a safe operation and an uncomplicated convalescence

If, however, the patient is partly or completely obstructed when he is admitted to hospital his preparation is much less simple The first factor to be overcome is the obstruction itself, and here, unless it is trivial, a suitable proximal colostomy, such as that of Devine or Wangensteen, should be performed Much has been written recently of the advantages of conservative decompression of the colon and some operators even carry out major resections upon colons significantly occluded but temporarily deflated by Harris Cantor or Miller Abbott tube drainage This we believe to be both dangerous and also situation. If a careful history is taken and general examination made, and especially if a meticulous digital and sigmoidoscopic examination of the rectum is done, the carcinoma can hardly escape detection. But if the investigation is cursory and incomplete and the patient is treated symptomatically or merely cozened with mineral oil and a diet the cancer will remain concealed and pursue its evil progress.

The last stages of the disease are not long delayed. Pain, that most frightening and distressing of symptoms, grips the patient; invasion of the urinary tract brings frequency and strangury to his misery; and distant metastases add jaundice, pruritus, ascites, and cough to complete his martyrdom.

Such then is the clinical pattern of the disease. Its presence is heralded by an unwonted constipation; announced by bleeding at defecation; proclaimed by a bloody slimy diarrhea; and diagnosed by the inserted finger and sigmoidoscope. It should almost never escape detection by the physician if only he feels and looks. It is curable in its earlier stages by the surgeon.

Differential Diagnosis: There are a number of conditions which can simulate carcinoma of the rectum and rectosigmoid. The more important of these are listed in Table 3.

Differential Diagnosis of Carcinoma of the Rectum and Rectosigmoid: diverticulitis; chronic ulcerative colitis; simple stricture of the rectum, (a) Spasmodic Stricture and (b) Inflammatory Stricture which include 1. postoperative, 2. traumatic, 3. irradiation proctitis, ulcer and structure and 4. lymphogranuloma inguinale. Other conditions are: benign tumors of the rectum; pressure from extrinsic tumors; and secondary invasion of rectum by a carcinoma originating in another pelvic organ.

Most difficulty will be encountered in the case of diverticulitis at or about the rectosigmoid junction. It occurs in early middle age, is frequently preceded by a history of bowel disturbances, the x-ray examination may be of no value for purposes of differentiation, and the affected segment of bowel may be beyond the reach of the sigmoidoscope. Also it occasionally happens that diverticulitis and carcinoma are present at the same time and recently two such cases have come under my care. In the first it was impossible to make the double diagnosis preoperatively; in the other a small papillary carcinoma was found in a short segment of pelvic colon, which was resected for recurrent diverticulitis. The most important difference in the clinical features of the two conditions is rectal bleeding. In carcinoma it is almost invariably and constantly present; in diverticulitis it is frequently absent or disappears when the acute phase of the disease is overcome.

The only other disease of the rectum which may be difficult to differentiate from carcinoma of the rectum is irradiation ulcer or stricture of the rectum which may follow x-radiation of the cervix uteri, for carcinoma. This hideous delayed effect of x-radiation may closely resemble primary cancer of the rectum and may give rise to severe and painful disturbances of defecation. The most important points of difference between the two conditions are: the history of previous irradiation therapy in the pelvis and, that biopsy specimens fail to reveal a primary carcinoma.

In the other conditions previously listed little serious difficulty will be encountered in making an accurate diagnosis. Care in examination will without doubt clearly distinguish them from a primary rectal cancer.

The Treatment of Carcinoma of the Rectum and Rectosigmoid: It is of paramount importance to remember that a patient with cancer of the rectum has had his disease for several months at least and that no matter how robust or well he seems to be a period of preparation is necessary before he can safely be brought through the ordeal of a large operation. In general terms there are two main aspects of each patient's case which must be considered: (a) The patient as a whole must be made "safe for surgery"; (b) The colon itself must be prepared for resection.

The Preparation of the Patient for Operation: The following features of each patient require separate consideration:

1. Correction of chronic malnutrition and low blood protein levels by an appetizing high protein high carbohydrate diet of about 5,000 calories value per day.

2. *Anemia.* Patients with carcinoma of the rectum are not infrequently anemic when their disease is first diagnosed. Repeated small

may presently be advocated for the treatment of carcinoma of the rectum are the following

Operations for the Treatment of Carcinoma of the Rectum and Rectosigmoid

1 Combined abdominoperineal resection (Miles[15]) or Perineoabdominal resection (Gabriel[16]) of the rectum with permanent abdominal colostomy
2 Abdominal resection of the rectosigmoid colon with low recto colic anastomosis (Devine[17])
3 Abdominal dissection with perineal resection and suture or union by other methods to a rectal cuff or the anus (Babcock,[18] Hockenegg,[19] etc)
4 Combined abdominoendorectal resection with preservation of a distal rectal cuff (Marden Black[20])
5 Abdominal resection of the upper rectum (Hartmann[21]) Permanent abdominal colostomy

These operative procedures and others devised by greatly gifted and skilful surgeons such as Dr H E Bacon, Mr J P Lockhart Mummery and Professor J Grey Turner may be divided into three groups

(1) Those operations whose object is the maximal removal of rectum and adjacent tissues in order that the possibility of local recurrence may be reduced to a minimum These procedures (of which the Miles combined abdominoperineal resection is the best example) have the one undesirable feature of permanent abdominal colostomy

(2) Operations which attempt radical extirpation of the carcinoma and adjacent tissues but preserve in greater or less degree a functioning external or internal and external anal sphincter Excellent examples of this group of operations are Sir Hugh Devine's abdominal resection of the rectosigmoid colon with low rectocolic anastomosis and Dr Marden Black's combined abdominoendorectal resection of the midrectum and upper part of the rectum

(3) Operations which remove the growth itself, an adequate length of bowel and adjacent lymphatic structures but which do not disturb the pelvic diaphragm The best known example of such procedures is the Hartmann operation

Sufficient experience of all groups has now been obtained to allow of firm indications being laid down for their employment

In my view, a Group I operation such as the combined abdominoperineal resection of the rectum (Miles) is indicated

(1) In all cases in which the lower limit of the tumor is less than 12 cms from the ano rectal line, that is 7 5 cms above the level of the reflection of the peritoneum forwards onto the posterior aspect of the bladder in males or vagina and uterus in females This view is firmly held and based upon the conviction that though perfectly feasible technically, no anterior resection or other operative procedure in Group 2 can be sufficiently radical at or below this level to deal adequately with such a lethal disease as carcinoma of the rectum, an opinion recently strongly reinforced by two cases which have come to my notice In both a very early but low lying carcinoma of the rectum had been skilfully excised by anterior resection In both local recurrence took place within 15 months

(2) In all cases in which the tumor is large and in which palpable lymphatic metastases are present in the mesorectum or mesosigmoid

(3) In all cases in which the tumor is adherent to other structures within the pelvis or in which retrograde lymphatic metastases may be present

A Group 2 operation such as anterior resection is indicated

(1) In cases in which the tumor is situated more than 12 cms from the anorectal line if the growth is almost certainly an early one of low malignancy without palpable lymphatic metastases The higher the lower limit of the tumor the more widely may this indication be accepted

(2) There are certain patients who genuinely would rather die than accept colostomy as the price of cure For these it is, I believe justifiable to carry out anterior resection with anastomosis even in the face of some unfavorable circumstances

A Group 3 operation such as the Hartmann procedure is, I believe, excellently suited to debilitated patients with high lying tumors The disturbance caused is very little greater than that from colostomy and is indeed frequently better tolerated and, if the patient's health improves very greatly, anastomosis with restoration of a functioning anus may be performed at a later date fundamentally unsound because these methods do not restore the proximal gastro-intestinal tract to normal. Digestion, absorption and excretion are therefore abnormal and adequate general dietetic preparation of the patient is impossible.

Emergency operative treatment is however rarely necessary except in the presence of acute intestinal obstruction, and even this complication does not necessarily require immediate operative relief. Twelve to twenty-four hours conservative decompression of the upper intestinal tract, during which fluid and electrolyte balances are restored to normal by suitable intravenous therapy, make it possible to form an accurate appraisal of the patient's general condition, cardiac reserve, and renal function. Digital and sigmoidoscopic investigation of the rectum, plain x-rays of the abdomen and, in some cases, a barium enema examination, will nearly always clearly indicate the situation of the growth. A planned and reasoned solution of the problem of surgical decompression can then be made and the most suitable site for a preliminary colostomy determined. This in general terms can be stated to be the most distal easily accessible mobile portion of the colon in which a preliminary colostomy will not materially interfere with subsequent maneuvres for the eradication of the growth and fields of possible lymphatic spread.

The colostomy having been established two problems remain which require solution:

1. The general metabolic preparation of the patient. This usually presents no special difficulty but takes longer than in the case of the unobstructed patient. It is conducted on similar lines, including the administration of succinyl sulphathiazole and penicillin.

2 The preparation of the distal colon and rectum. The following procedure is carried out for a week before operation:-

a The lower colon is irrigated with physiological saline until it is clear.

b The distal loop of the colostomy is cleansed in a similar manner

At first difficulty is often encountered and [illegible] [illegible] extent of this loop may seem inex- [illegible] Hard fecal accumulations may even [illegible] [illegible] [illegible] by instillations of min- [illegible] [illegible] possible. At the conclusion of each irrigating session two grams of a suspension of succinyl sulphathiazole should be instilled into both the proximal colonic loop and rectum.

After a few days of this regimen the distal colon frequently becomes patent once again and through and through irrigation finally completes the preparation of the colon for operation.

The Operative Treatment of Carcinoma of the Rectum and Rectosigmoid: Any elective operative procedure for the cure of carcinoma of the rectum should: (1) extirpate the tumor and also remove at least 4 cms. of bowel above and below the discernible limits of the tumor; (2) remove all removable fields of lymphatic spread; and (3) restore fecal evacuation to normal or provide an efficient and satisfactory alternative method of elimination.

In the ideal circumstances of an early growth of the upper rectum, without demonstrable metastases, all these criteria can usually be fulfilled. In advanced cases complete removal of all distant metastases may be impossible and in these circumstances the most satisfactory palliative operation should be performed. This, in the majority of such cases, is removal of the growth itself and adjacent lymphatic metastases with construction of a permanent abdominal colostomy. In some cases only a proximal colostomy may be possible and it may even not be feasible to remove the tumor itself.

But whatever is contemplated and attempted, the surgical maxim of fitting the "operation to the patient" and not the "patient to the operation" should never be forgotten and staged procedures are of the greatest possible value in the debilitated patient.

The actual operative technics designed to cure or palliate carcinoma of the rectum have undergone a gradual evolution since Littre[11] performed the first successful extirpation of the rectum in 1826. A great and distinguished company of surgeons has piled fact upon fact and observation upon observation until today technics are refined and comprehensive, mortality and morbidity reasonable, and results in the main predictable and encouraging.

In my opinion the several operations which but from Gaston's results it appears to be somewhere between 7 and 2 cms above the muco cutaneous line and may in fact be at the level of the anterior peritoneal reflection

Tumor Characteristics The influence of the degree of dedifferentiation and therefore of malignancy upon cure rates has been amply demonstrated by such authorities as Rankin and Broders,[25] and Gabriel,[11] who have beyond all question shown that the more dedifferentiated the tumor the more unfavorable is the ultimate prognosis There is no question therefore that conservative resection must never be done if the biopsy of the tumor shows it to be highly malignant, even if it is situated very high in the rectum or at the pelvirectal junction as only the most radical removal possible will offer any chance of permanent cure

To summarize therefore from the criteria considered

1 All highly malignant dedifferentiated carcinomas of the rectum should always be treated by radical abdominoperineal resection

2 Any carcinoma of the rectum whose lowest limit is less than 12 cms from the anorectal line should be treated by radical abdominoperineal resection

3 Anterior or conservative resection should only be performed for tumors of low malignancy situated high in the rectum, and, to preserve sphincteric continence, the level of the anastomosis between pelvic colon and lower rectum should not be lower than the level of the anterior peritoneal reflection

Operability Mortality It is outside the scope of this paper to discuss in detail the many factors which influence both the operability and mortality of operations upon the rectum for the cure of cancer In general terms, however, it may be said that today about 85 percent of all cases of carcinoma of the rectum are operable, that is the growth is removable when first diagnosed This comparatively high operability rate compares favorably with that which obtained ten years ago when it averaged approximately 60 percent (St Mark's hospital statistics 61 1 per cent, Goligher [6]) and reflects the many recent advances in preoperative preparation and operative technic At the present time it seems that any further rise in the rate of operability is unlikely to be large unless it becomes possible to diagnose carcinoma much earlier

Operative mortality likewise has been substantially reduced in recent years, mainly because of better preoperative preparation, vastly improved anaesthesia, and the widespread use of blood transfusion and antibiotic therapy Among competent operators today the variations in mortality depend very largely upon the risks accepted and the fortitude with which the individual surgeon attempts the nearly impossible to the probable detriment of his "game book" But even if serious risks are *accepted the present day* mortality is less than 10 percent (in our own series of 36 cases it was 8 3 percent) and several authorities have recently reported series in which the post operative fatality rate was in the neighborhood of six percent,[7, 28] a risk which is surely acceptable in view of the magnitude of the operations themselves, the commonly advanced age and debilitated condition of the patient, and the great benefits which may be gained

The fate of untreated patients is in sharpest and most bitter contrast and has been most ably presented by Daland, Welch and Nathanson,[14] who reported one hundred untreated cancers of the rectum Table 3 taken from their paper is most truly informative

TABLE 3

Carcinoma of the Rectum (Daland, Welch, and Nathanson)

Untreated Cases

		Duration of Life in Months from onset of symptoms	
	Cases	Average	Medium
Untreated Cases	100	17 2	14 0
Colostomy only	80	16 9	11 0
Colostomy and Radiotherapy	32	18 8	15 0

SUMMARY

Thus the untreated patient may have a year and a half to live, much of the time in direct misery Colostomy does not prolong his life and radiotherapy appears to be of little help There is indeed at present no hope for the patient with a carcinoma of the colon, In judging and assessing the results of these three groups of operations, the following criteria are in my opinion valid: (1) the percentage long term survivals achieved; (2) the functional results obtained; and (3) the characteristics of tumors for which operative cure was attempted, especially their degree of anaplasia and the extent to which they had spread.

Survival Rates: There is no doubt that the best test of any operative procedure for the cure of cancer is the percentage of long term cures without demonstrable recurrences which it achieves. The usual period selected for purposes of discussion is five years, a time interval which may however, as Gilchrist and David[22] point out, be too brief for really accurate evaluation of a method of treatment, since six of their 114 patients operated upon for carcinoma of the colon and listed as five-year cures developed recurrences and were dead or dying in less than seven years. The five-year survival rate will however be used in this present discussion because it is the period commonly employed and the one concerning which there is the most complete information.

The five-year survival rate following radical abdomino-perineal resection of the rectum is approximately 40 to 50 percent. For example, Gabriel[11] reports 47.1 percent; T. Jones 52 percent; and Rankin[6] 38 percent. There are innumerable variables in all statistics and an average is difficult to obtain but the approximate figure of 45 percent may be close to the truth. The disease therefore is one which is accompanied by a high recurrence rate even when treated by the eminent authorities quoted in the most radical possible way. Its survival rate is also disappointing when compared with that of carcinoma of the ascending colon, which is approximately 60 percent (Rankin[6] 57.6 percent) and it may well be that the explanation of the difference in survival rates is the much wider resection of mesentery and lymph nodes achieved by right hemicolectomy than radical abdominoperineal resection of the rectum.

Therefore, if the survival rate following the maximal removal of rectum and pelvic tissues achieved by combined abdomino-perineal resection compares unfavorably with the much wider ileotransverse colon resection, the survival rate of conservative resection of the rectum is unlikely to compare favorably with a truly radical removal of the rectum and tissues adjacent to the growth. As yet insufficient data is available for an accurate comparison to be made between the survival rates of radical abdomino-perineal resection and anterior or conservative resection with anastomosis, but until such data is available and unless conservative resection is found to achieve nearly as high a cure rate, it is my opinion that conservative resection should only be done for undoubtedly early growths of low malignancy without metastases.

Functional Results: There is no doubt that even the most perfectly functioning abdominal colostomy is a serious affliction and any procedure which will preserve a continent anus is greatly to be desired. Numerous operations have been designed with this end in view with varying success. Recently the problem has been investigated by Eugene Gaston,[23, 24] who has made a most valuable contribution to our knowledge of the physiology of fecal continence. He points out that "fecal continence is of two types, colonic and sphincteric. Colonic continence is the plastic adaptation of the colon to the enlarging fecal mass; it is retained following resections of the rectum whether the sphincters are preserved or not. Sphincteric continence refers to the conscious and especially the reflex retention of bowel contents by contraction of the external sphincter muscle."

He found that when the rectum was entirely removed and an anastomosis carried out between sigmoid colon and the anus at the level of the mucocutaneous line, loss of sphincteric continence resulted and the patient then had in effect a perineal colostomy which is in my experience less satisfactory and more difficult to manage than an abdominal one.

In contrast, resection of the sigmoid colon with anastomosis to the distal rectum at the level of the peritoneal reflection caused no change in rectoanal reflexes and there was no loss of colonic or sphincteric continence. The actual level below which removal of rectum results in the abolition of sphincteric continence has not definitely been determined

Volvulus of the Midgut

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CONGENITAL anomalies of the intestinal tract are occasionally found in surgical practice One of the rather rare causes of intestinal obstruction is associated with a *congenital defect in the disposition of* the midgut The foregut and hindgut are practically immune to anomalies of disposition The midgut on the other hand undergoes a rather complicated series of maneuvers before it finally arrives at what we consider the normal anatomical position

EMBRYOLOGY

The midgut is forced out into the umbilicus about the eighth week and several weeks later is returned into the abdomen The small bowel reenters the abdomen on the right side of the superior mesentric artery and is followed by the cecum and ascending colon and the right half of the transverse colon As they return into the abdomen, the small bowel enters first, drawing the cecum after it—which, being the largest part, is the last to return When it has returned it passes upwards and to the right from the umbilicus, crossing in front of the superior mesentric artery Later it descends into the right iliac fossa

During the process of the migration of the cecum and right colon, the small bowel is pushed over towards the middle line so that it lies medial to the cecum and ascending colon Once the various segments of the midgut have reached their permanent position, their mesenteries become attached to the posterior abdominal wall in this situation The area of attachment is quite large and is triangular in shape, starting from a point on the left of the second lumbar vertebra downwards and to the right into the right iliac fossa, and then upwards to just below the liver, and then across to its starting point

The mesentery of the small bowel and of the right half of the colon thus enclose a triangular area of quite a large extent on the posterior abdominal wall

Thus it is well to keep in mind that two things have happened—first the midgut has rotated from the eight-week position to what is the normal, permanent position Secondly the mesentery of the midgut has become at*tached to the posterior abdominal wall over a* wide area

There may be a failure of either of these processes The midgut may fail to rotate and this failure may be complete or only partial *When it completely fails* to rotate the duodenum proceeds directly downwards from the pylorus into the right iliac fossa and all of the small bowel lies on the right side of the abdomen and all of the large bowel on the left—the ileum entering the cecum on its right side

Partial rotation may occur and the cecum may overlie the second part of the duodenum, in which case it often becomes attached to it by membranous bands It may proceed some*what farther and lie just below the liver* This is known as "non descent"

Failure of fixation of the mesentery of the whole of the midgut may be associated with any of these degrees of malrotation Or the mesentery of the right half of the colon may acquire fixation to the posterior abdominal wall while the mesentery of the small bowel fails to adhere except around its origin where the superior mesenteric vessels enter and leave In this latter case the small bowel alone may undergo volvulus without the right half of the colon being associated with it

The two types of anomaly must be kept clearly in mind—first, the failure of rotation (either complete or partial) and secondly the failure of fixation of the mesentery When the fixation of the mesentery is minimal the whole midgut is then hanging from a pedicle consisting mainly of superior mesenteric vessels and it thus runs the risk common to all pedunculated viscera—the risk of torsion of the pedicle which in this case would constitute a volvulus This is the type of case that we are particularly interested in in this paper

In considering cases of intestinal obstruction it is well to keep this possibility in the except in surgery which removes the growth itself and possible fields of spread. Let us therefore be suspicious of the trivial but persistent symptom, inflexible in our determination to investigate and reinvestigate, and forthright in our advice, that in the presence of carcinoma of the rectum only by the way of surgery can cure be found.

RIASSUNTO

Giunge alla conclusione che l'unica speranza per i pazienti affetti da carcinomi del colon e' l'operazione radicale, cioe' l'asportazione del tumore a delle possibili propaggini. La colostomia e' di scarsa utilita' e la radioterapia serve quasi a nulla. Ecco perche' l'indagine diagnostica e' sempre imperativa, ed ecco perche' va eseguita con ogni possibile risorsa clinica.

SUMARIO

El paciente que no es tratado puede durar un ano y medio y pasara la mayor parte de este tiempo en sufrimiento continuo. La colostomia no prolonga su vida y la radioterapia aparentemente es de poco valor. Al presente la cirujia es el unico tratamiento que ofrece cierta esperanza a los casos de cancer del colon, por cuanto este procedimiento remueve el tumor y posiblemente hasta su propagacion. Por lo tanto es importante el sospechar todo sintoma que es persistente, no importa lo trivial que este sea. Solo asi la cirujia del cancer del recto ofrecera la posibilidad de su curacion.

SOMMAIRE

Le malade non traité aura une survivance d'un an à un an et demi, dans lesquels il souffrira beaucoup. La colestomie ne prolonge pas la vie et la radiothérapie ne paraît pas être d'une grande valeur. En vérité, il n'y a pas d'espoir pour le malade ayant un carcinome du colon excepté par l'aide chirurgicale permettant l'ablation de la tumeur et de la région environnante attaquée. Soyons sur nos gardes en présence de symptomes triviaux et persistants et soyons inflexibles dans notre détermination de chercher et de rechercher la présence du carcinome du côlon qui ne peut être guéri que par une intervention chirurgicale.

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CONGENITAL anomalies of the intestinal tract are occasionally found in surgical practice One of the rather rare causes of intestinal obstruction is associated with a congenital defect in the disposition of the midgut The foregut and hindgut are practically immune to anomalies of disposition The midgut on the other hand undergoes a rather complicated series of maneuvers before it finally arrives at what we consider the normal anatomical position

EMBRYOLOGY

The midgut is forced out into the umbilicus about the eighth week and several weeks later is returned into the abdomen The small bowel reenters the abdomen on the right side of the superior mesenteric artery and is followed by the cecum and ascending colon and the right half of the transverse colon As they return into the abdomen, the small bowel enters first, drawing the cecum after it—which, being the largest part, is the last to return When it has returned it passes upwards and to the right from the umbilicus, crossing in front of the superior mesenteric artery Later it descends into the right iliac fossa

During the process of the migration of the cecum and right colon the small bowel is pushed over towards the middle line so that it lies medial to the cecum and ascending colon Once the various segments of the midgut have reached their permanent position, their mesenteries become attached to the posterior abdominal wall in this situation The area of attachment is quite large and is triangular in shape, starting from a point on the left of the second lumbar vertebra downwards and to the right into the right iliac fossa and then upwards to just below the liver, and then across to its starting point

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In considering cases of intestinal obstruction it is well to keep this possibility in the back of your mind in regard to the diagnosis and also at operation.

MECHANISM OF VOLVULUS

The volvulus may be acute, or chronic, or intermittent. In quite a few of the cases there is a history of preceding mild or severe attacks that recovered spontaneously.

In the cases that we have seen and operated on the condition was, in the majority, sufficiently severe to cause obstruction of the lumen of the gut. This obstruction may occur at both ends of the twisted loop—the oral end being the duodenum below the bile papilla, and the caudal end being the middle of the transverse colon.

Obstruction of the duodenum was much more marked than obstruction in the colon and was the cause of all the symptoms. If the lower end was also obstructed it could give rise to a "closed-loop" type of obstruction, but we have never seen this occur. In the majority of our cases, the small bowel was completely empty and collapsed. This complete emptiness of the obstructed loop is important because it gives rise to a markedly scaphoid abdomen in some cases, and one does not usually associate intestinal obstruction with a scaphoid abdomen. However, in this case the obstruction is high up and there may be distention of the epigastrium with a very markedly collapsed bowel below.

In only one case was the volvulus so marked

FIGURES 1 to 6 show normal development, rotation and attachment of the midgut. The midgut extends from the bile papilla to the middle of the transverse colon and is supplied by the superior mesenteric artery.

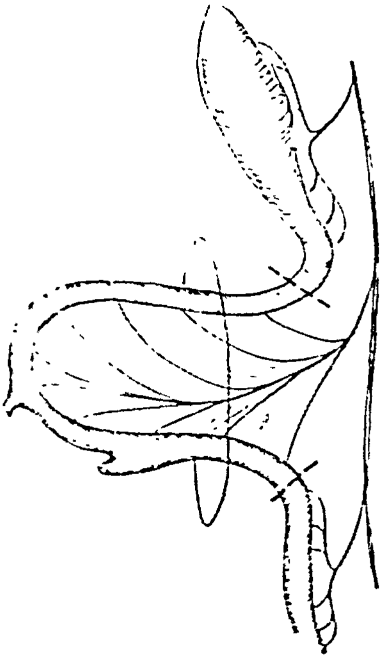

Fig. 1

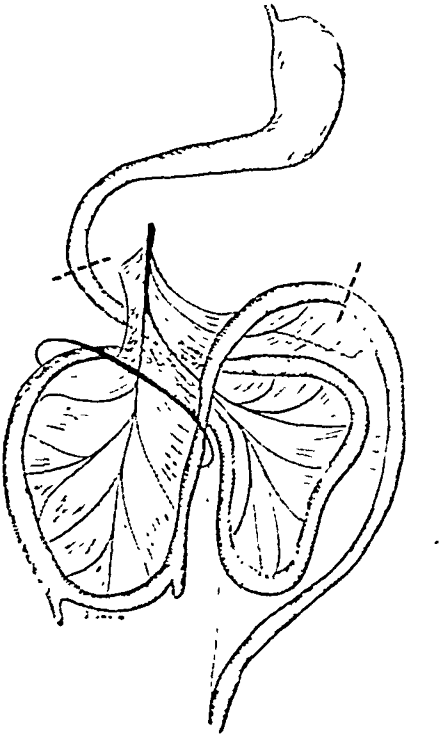

Fig. 2

[illegible] gut and hindgut with their respective blood supplied at the fifth week of foetal life [illegible] 10 weeks the midgut grows rapidly and protrudes through the umbilical orifice. The [illegible] at the proximal portion of the midgut and it rotates in the umbilical orifice.

[illegible] cavity enlarges and the midgut returns into it. The small bowel returns first and is [illegible] superior mesenteric artery by the following coils.

[illegible] return and the colon lies on the left side. It then passes upwards and [illegible] artery

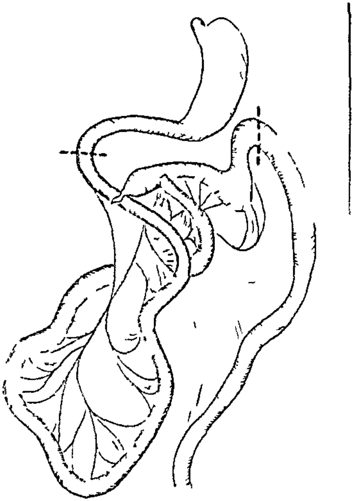

Fig 3

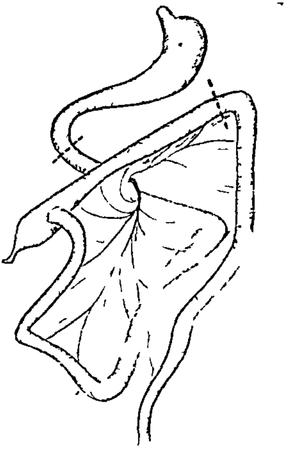

Fig 4

Fig 3 At the eleventh week all of the alimentary tract is within the abdomen

Fig 4 Shows the rotation of the cecum It is now in the right upper quadrant The midgut has rotated through 270° counter clockwise

as to cause interference with the blood supply of the bowel and this case went on to massive gangrene of the bowel and death of the patient

SYMPTOMS AND SIGNS

The early symptoms are pain, rapidly followed by persistent vomiting The vomitus consists of bile and gastric contents, and is rarely feculent On examination of the patient, the striking features are a possible distention high up in the epigastrium due to a dilated stomach and upper duodenum, but the remainder of the abdomen may be scaphoid

Plain films of the abdomen will often show a dilated stomach and duodenum with almost complete lack of gas bubbles below *Barium enema* may show the whole colon on the left side or it may show a cecum high and near the mid line indicating incomplete rotation Barium series when not in the acute obstructive phase may show the duodenum descending down into small bowel to right of mid line indicating non rotation

OPERATIVE TREATMENT

The condition is readily recognized at operation because the abdomen seems to be occupied by small bowel only and the cecum and ascending colon are not visible at all If the hand is passed along the posterior abdominal wall from the pelvis upwards on the right side it will be found to pass up to the level of the origin of the superior mesenteric artery, the attachment of the mesentery of the small bowel and right half of the colon being absent except at this one point At this spot the twisted mesentery will be readily recognized

If this is grasped the whole of the midgut can be lifted out on to the abdomen and the volvulus undone The intestines may then be replaced in the abdomen in their proper anatomical positions To ensure that they remain

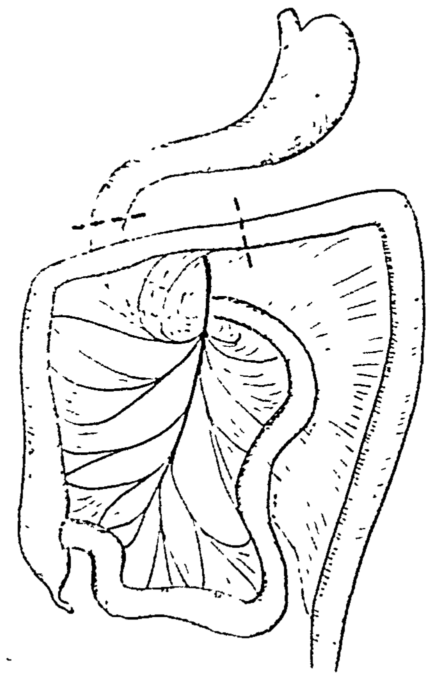

Fig. 5

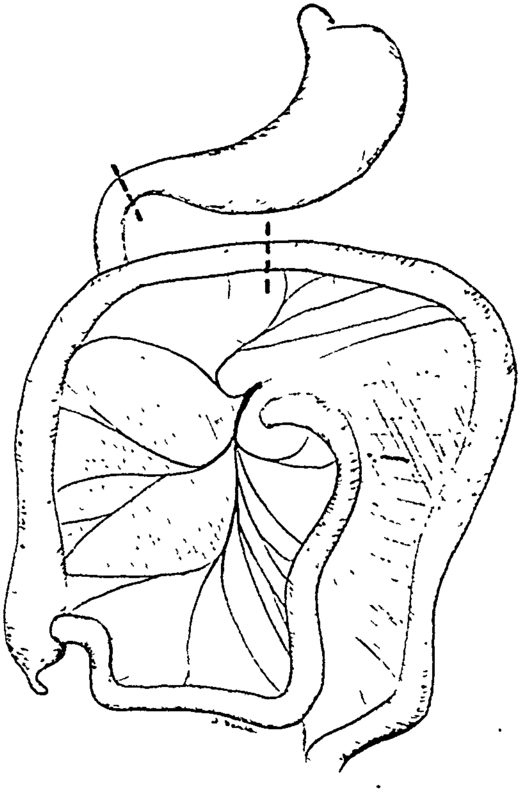

Fig. 6

Fig. 5. Shows rotation and descent of cecum completed. At this stage there is no fixation of the mesentery and the whole midgut has a common mesentery.

Fig. 6 Shows the final fixation and attachment of the mesentery. The stippled portions become fused to the posterior abdominal wall. The ascending colon thus becomes anchored and the small bowel mesentery fuses down to the cecum from the origin of the superior mesenteric artery. This fixation prevents torsion and volvulus.

there the cecum and ascending colon may be sutured to the right lateral peritoneum. This prevents a recurrence of the volvulus as the cecum and ascending colon are then fixed. In our three cases of volvulus in infants, on undoing the volvulus, the cecum and ascending colon were bound over the duodenum by peritoneal bands. These bands must be divided and the cecum allowed to fall over to the left into the true non-rotated position as illustrated in Figures 7 and 8.

It is very important, as Ladd has emphasized in children to look for these bands after undoing the volvulus. If this is not done the patient may go on vomiting postoperatively [illegible] duodenal obstruction. In infants we [illegible] fixed the cecum and ascending colon [illegible]. We have found no ill effects [illegible] fixation of the cecum and ascending colon to the right lateral peritoneum.

CASE REPORTS

Case 1: Baby girl O., age 2 days, January 1947, who was admitted to Children's hospital, January 1947, vomiting everything since birth. Bile in the vomitus. Child passing meconium. Sick, listless child.

Abdomen grossly distended and under tension. Rectal examination negative.

Flat plate shows several loops of small bowel containing gas.

Operation: Laparotomy. Clockwise volvulus of whole midgut around unattached mesentery. Bloody fluid in the abdomen. Small bowel black and clinically gangrenous. Cecum anchored by band across duodenum. Volvulus undone, band cut,—prognosis hopeless. Died 12 hours after operation. Postmortem showed whole small bowel gangrenous.

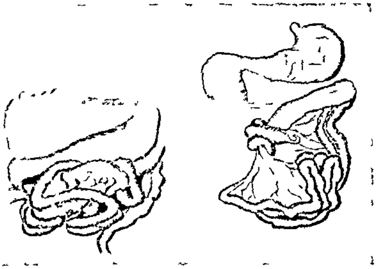

Fig. 7

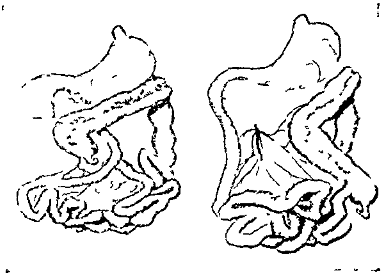

Fig 8

FIGURES 7 and 8 are sketches of the findings at operation in cases 1, 2 and 3

On opening the abdomen no cecum or ascending colon is seen Figure 7 at left. At right of Figure 7 after delivery of the small bowel out of the abdomen the cecum and ascending colon are seen wrapped around the root of the superior mesenteric artery.

At left Figure 8 the volvulus has been undone and the peritoneal fold running from cecum and ascending colon can be seen obstructing the duodenum At right Figure 8 the peritoneal band has been divided relieving the obstruction of the duodenum and the cecum and ascending colon have fallen over to the left in the non rotated position and the duodenum goes straight down to the right of the superior mesenteric artery.

Case 2: Baby boy B., age 27 days, June 24, 1948 Recurring vomiting with bile in vomitus since birth Seen 26 days after delivery. Abdominal examination negative. Gastric series—some delay in barium passing through duodenum with some narrowing distal part. Jejunum and duodenum all on the right side. Barium enema. Cecum high near midline. Impression. Incomplete rotation

Operation: June 24. Partial volvulus of small bowel, chronic, clockwise, unwound. Cecum and ascending colon bound by band across duodenum. Band divided. No fixation of mesentery of small bowel. Postoperatively child gained weight from 4 pounds 9 ounces to 5½ pounds No vomiting Wound disruption occurred June 29 in the night, with sudden shock, sub-normal temperature Died shortly following suture of wound.

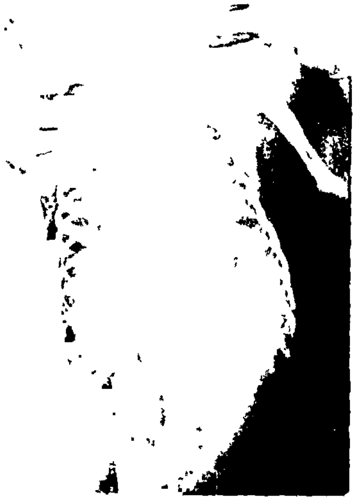

Fig 9 X ray shows the stomach and duodenum in *Case 2*. It will be noted that the duodenum goes straight down into jejunum on the right side and there is some dilatation of the duodenum

Case 3: R. W , age 1 year, Oct. 19, 1947. Since November 1946—recurrent attacks vomiting, almost every month. Oct. 19, 1947, was admitted to Children's hospital Vomiting bile 24 hours prior to admission. Had had repeated admissions to hospital—investigated for subdural hematoma as a cause. Examination—abdomen scaphoid, slight distention in epigastrium. Child listless Flat plates: Greatly dilated stomach. Barium showed some retention in 24 hours—25 percent in stomach. After subsidence of attack barium revealed dilatation first, second and third portions of duodenum. Jejunum on right side. Barium enema: Cecum high and medial. Impression: Lack of rotation of midgut.

Operation. November 1. Midgut volvulus through 360° clockwise. Cecum and ascending colon bound over duodenum by peritoneal folds. Small bowel mesentery undeveloped. Volvulus undone. Peritoneal fold about cecum and ascending colon divided. Mesenteric veins congested. Lymph nodes enlarged. Uneventful recovery to date. No recurrence of symptoms.

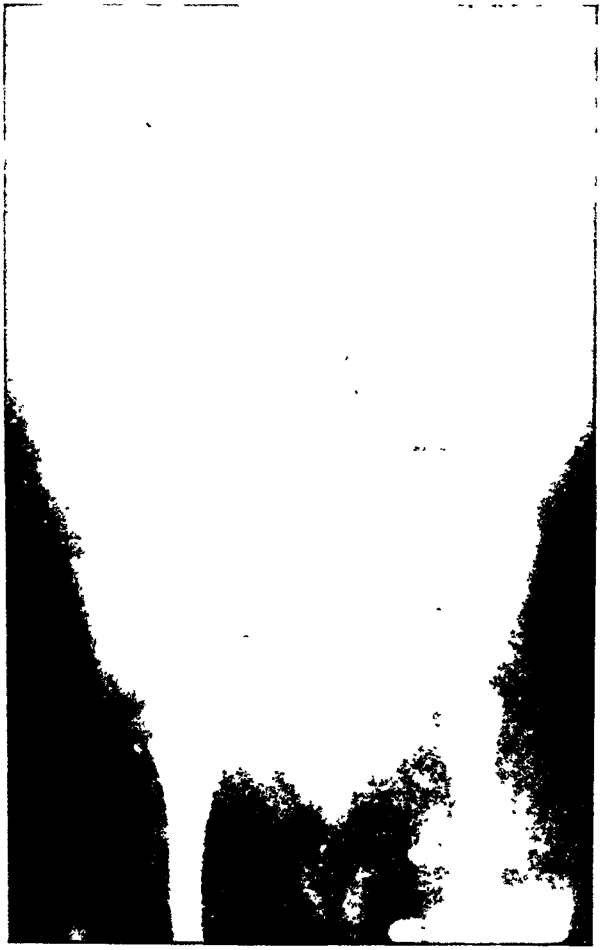

Fig. 10. This flat plate shows the markedly dilated stomach in *Case 3* during acute attack of volvulus. No gas is shown in the small bowel.

Case 4: S. C., age 14, Nov. 30, 1941. Recurring attacks abdominal pain and vomiting for several weeks. Operation, Rural hospital, two weeks previously for appendicitis. Vomiting persisted.

One week prior to admission had second operation. Nothing was found. Vomiting persisted.

Operation: Volvulus whole midgut. Volvulus undone. Cecum and ascending colon anchored to right parietes. Immediate and complete recovery.

Case 5: M. E., age 14, Dec. 21, 1942. Perfectly well until [illegible] prior to admission. Acute upper

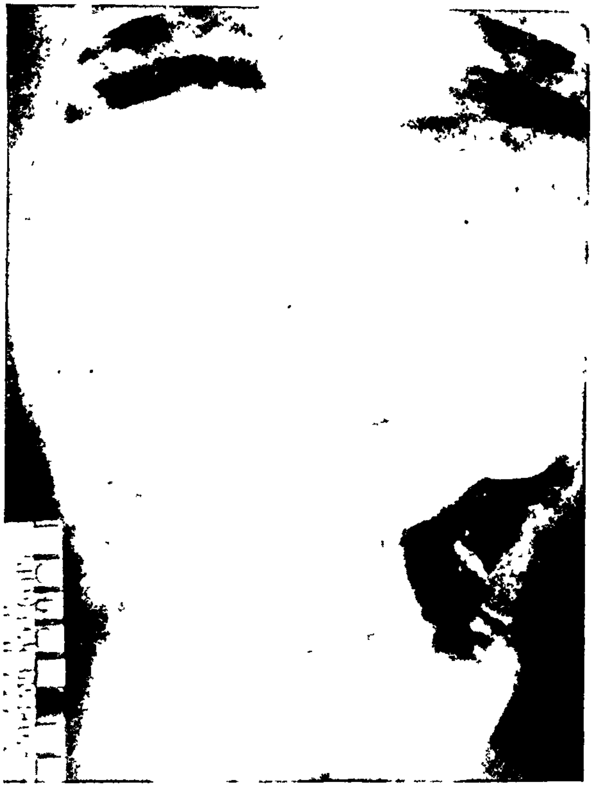

Fig. 11. The stomach and duodenum in *Case 3* after subsidence of acute attack of volvulus is shown. Note the dilatation of the duodenum and the fact that the duodenum descends on the right to become jejunum.

abdominal pain with immediate vomiting. Abdomen scaphoid. Diagnosis by internist—volvulus midgut.

Operation: Volvulus undone. Appendectomy. Suture cecum and ascending colon to right parietes.

Case 6: R. M. C., age 25, Feb. 23, 1947. Abdominal pain and vomiting two days. Abdomen not scaphoid. No previous attacks or operations.

Operation: Mass upper right quadrant consisting of distended cecum, ascending colon and transverse colon and all small bowel rotated on mesentery consisting of superior mesenteric vessels only. Left half transverse colon had a very short mesentery and adherent to cecum. These were separated, volvulus undone, and right colon anchored in normal position.

Case 7: Mrs. W., age 32, December 1948. Hysterectomy, large fibroids, 1947. Intestinal obstruction band P.O., March 1948. Recurring attacks abdominal pain, severe enough to keep her miserable all the time. Each time she ate pain was worse. Slight relief from bowel movement. Pain was making her a chronic invalid. X-ray: Colon on left side abdomen, small bowel on right.

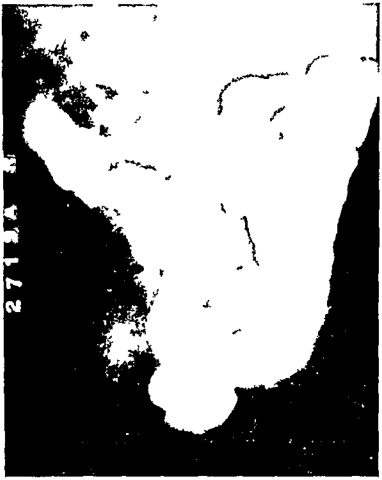

Fig 12 Barium enema in *Case 3* showing high cecum near midline—suggestive of incomplete rotation

Operation Dec 29, 1948 Right paramedian incision On opening the abdomen the cecum ascending colon transverse colon were all on the left side of the abdomen Right side was full of small bowel Stomach appeared normal Duodenum dropped down from the pylorus straight down to the right side of the abdomen with the vessels coming in from the left side All of the midgut could be brought outside the abdomen and was suspended by a narrow pedicle surrounding the superior mesenteric vessels There was no attachment of the mesentery to the posterior abdominal wall except over the narrow area surrounding the superior mesenteric vessels

The hand could be passed up from the pelvis along the posterior abdominal wall in the middle line and on to the right side up to the level of the second lumbar vertebra The gut was rotated by moving the cecum and ascending colon across to the right side and pushing the small bowel medially and to the left and the cecum and ascending colon were fixed in their normal position

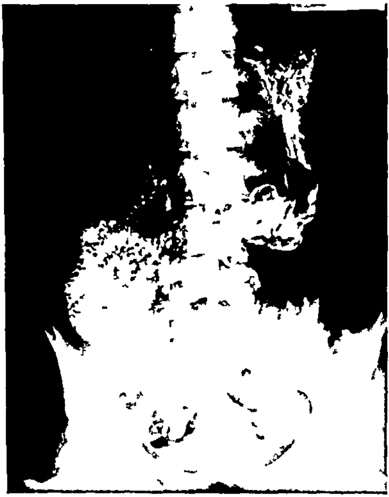

Fig 13

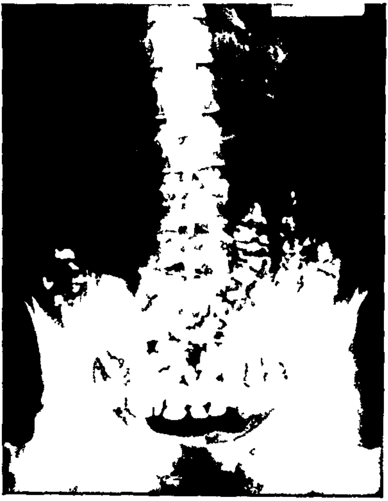

Fig 14

Fig 13 Barium series in *Case 7* showing small bowel all on right side

Fig 14 Barium enema in Case 7 showing all of colon on the left side, typical of non rotation

Although no volvulus was found at operation it was felt that this woman was having intermittent attacks of partial volvulus. She has had no symptoms since operation.

Case 8: Mrs. T., age 5[illegible], Dec. 8, 1945. June 1945 she had a fall and shortly after developed attacks right upper quadrant pain with gas in the stomach and hunger pains immediately after meals. No vomiting. Examination: Firm mass right upper quadrant. Barium enema: Redundant ascending colon swinging over to the left and then running to right to reach hepatic flexure. Gall bladder visualization negative. I.V.P. negative.

Operation Dec. 22, 1945. It was found that the sigmoid was adherent to the anterior abdominal wall on the right side. This was freed and it was then discovered that the whole midgut had no attachment to the posterior abdominal wall and was free to move in any direction. The cecum and ascending colon were sutured in their normal position in the right parietal peritoneum. This case like Case 7, was felt to be one of recurring volvulus.

Case 9: Mrs. O. G., age 52, January 1944. Duodenal ulcer many years. 1938, posterior gastroenterostomy. Temporary satisfactory result, then attacks of vomiting. Second operation 1942, anterior gastroenterostomy done in addition to posterior one. Has had recurrent attacks of vomiting and pain since this operation.

Operation: Operation January 1944 undertaken with intention of undoing both gastroenterostomies and doing a gastric resection. Both gastroenterostomies were undone, and it was then found that the mesentery of the small bowel was not attached except at its upper extremity, and where the ileum entered the cecum, and the small bowel had undergone partial volvulus.

It then occurred to us that the attacks of vomiting were due to the volvulus of the small bowel and not to any mechanical difficulties with his gastroenterostomies.

There was no sign of any jejunal ulcer. The duodenal wall was exceedingly hypertrophied—almost cartilaginous in thickness, and it was decided to do another properly-placed posterior gastroenterostomy.

This man is still well. Nothing was done to prevent recurrence of his volvulus.

SUMMARY

Nine cases of volvulus of the midgut are reported. The cases ranged in age from two days to 52 years. The operative treatment is described, and it is emphasized that midgut volvulus may be the cause of obstructive symptoms without distension and that it can occur at any age.

RIASSUNTO

Illustra nove casi di volvolo dell'intestino tenue (porzione media). L'età varia da 2 giorni a 52 anni. Descrive la cura operativa. E' significativo il fatto che il volvolo può provocare sintomi di ostruzione senza distensione intestinale.

SUMARIO

El autor reporta nueve casos de vólvulo del segmento medio del intestino grueso en pacientes cuya edad varió de dos días a 52 años. Describe el método operatorio usado y da énfasis al hecho de que este tipo de vólvulo puede ocurrir en cualquiera edad y produce síntomas de obstrucción intestinal sin causar distensión.

SOMMAIRE

Neuf cas de volvulus de l'intestin grêle sont passés en revue. L'âge des malades variant de deux jours à 52 ans; le traitement opératoire est décrit et l'auteur nous rappelle que le volvulus de l'intestin grêle peut être la cause de symptômes obstructifs même en l'absence de distension et peut survenir à tout âge.

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Stainless Steel and Early Ambulation in Hernia Repair

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THE repair of indirect and particularly of direct herniae remains a problem. Every year sees new methods being devised and old methods being abandoned or readapted. The Bassini operation has been both condemned and endorsed many times in the past decade by excellent surgeons. The operations of McArthur and Gallie and their modifications have also been found successful in some centers and unsuccessful in others. The McVay operation has in general been well received, especially as an adjunct to other types.

The suture material to be used is also a debatable point. The general trend in North America at present seems to be the use of nonabsorbable materials or fascia.

A brief survey of the rate of recurrence for repaired inguinal herniae shows the following. Cattell and Anderson report a series of 194 operations on 150 patients with 13 recurrences (6.7 percent), eight of these recurrences were in the 44 bilateral operations (18.1 percent). Hicks reports 300 cases of unilateral inguinal hernia with a recurrence rate of five per cent. Joyce traced 544 hernia operations and found 2.94 percent had recurred. Zimmerman has 59 cases of direct inguinal herniae with a recurrence rate of 10.2 percent. Craig followed up with 154 cases of indirect inguinal herniae and found 3.2 percent recurred. Glenn reports on 559 indirect hernia repairs with three percent recurring, and 220 direct hernia repairs with 8.1 percent recurring.

Pratt, an advocate of stainless steel wire and early ambulation, reports four known recurrences out of 156 cases followed 12 months or longer and 220 cases followed six months.

The series being reported here represents the patients who have had operations in the years 1945 to 1948 inclusive. Only inguinal herniae in adults are considered. Herniae in children almost never recur. No femoral, umbilical, incisional or other types are included.

There were 390 cases operated upon during this time but only 157 could be traced with certainty. A large majority of untraceables represents loggers, fishermen, merchant marine seamen and other laborers who are essentially young and healthy. This probably gives this series a larger proportion of older people than is included in many reported series. It may also be noted that the majority of these untraceable patients would return to the same surgeon in case of recurrence. Of the laborers in this reported series, the recurrence rate is nil.

We have followed a rather routine procedure in our hernia cases. In cases of indirect hernia the Bassini type of repair has been used in all cases, with some slight modifications. The sac is dissected off the cord to the level of the internal ring, where it is doubly ligated with plain O catgut. The stump is then dropped in without transfixing. Next, the floor of the inguinal canal is reinforced by suturing the conjoined tendon to Poupart's ligament, using interrupted No. 32 stainless steel wire. The wire is tied so as not to strangulate, but simply approximate the tissues. We feel it very important to have the most inferior suture include the periosteum of the pubic tubercle.

If the internal inguinal ring is large, its size is also decreased to where it fits snugly around the cord. The cut edges of the external oblique are sutured over the cord with continuous chromic 00 catgut. The size of the external ring is not important provided it isn't too tight.

Direct herniae should be well visualized and exposed. The defect in the transversalis fascia is in all cases dissected out, the hernia reduced and the clean cut edges of fascia sutured together with chromic 00 catgut.

In cases where the entire transversalis fascia is too badly thinned out to be used in this manner, we use a McVay type of procedure. Following this, a Bassini operation is done as already described.

All patients are ambulatory in 24 hours. They may get out of bed in 12 hours if they wish, but they must be walking in 24 hours

All dressings are removed in 24 hours and the incision remains bare. Catheterization rarely is necessary but once. They are dismissed from the hospital on the eighth postoperative day. In six weeks men doing heavy labor are allowed to return to work, sedentary workers sooner.

Of 157 cases here reported, 100 are indirect and 57 are direct.

Of the 100 indirect herniae repaired, one recurred (one percent). The original operation was done primarily for a direct hernia at which time a very small indirect sac was dissected and ligated. This small sac recurred in 18 months, although the direct hernia repair held. A second operation was done with good results.

Of 57 direct herniae repaired, four recurred (seven percent): 12 of the 57 were bilateral. The four recurrences were as follows:

1. A 70-year-old physician who had a bilateral repair developed a left-sided recurrence.
2. A 69-year-old retired farmer who had a bilateral repair developed a cough and pneumothorax. On recovering he had a very small bulge on the left side.
3. A 65-year-old man who had a large right recurrent direct inguinal hernia repaired, now has a small, asymptomatic bulge.
4. A 54-year-old machinist who had a third recurrence repaired with wire in July 1945, had a recurrence in November 1945 at which time the cord was removed and a tight repair obtained. He has since been asymptomatic.

We have found stainless steel wire very satisfactory for several reasons. It causes no demonstrable tissue reaction. Narcotics are rarely necessary after 12 hours. It holds the tissues in approximation until healing processes are sufficient. It allows for early ambulation without any increase in rate of recurrence. Finally, we have found it satisfactory in some of the most difficult of large direct herniae.

SUMMARY

A series of 157 hernia repairs using stainless steel wire and early ambulation was reported. Of 100 indirect hernia repairs there was one recurrence—a rate of one percent. Of 57 direct hernia repairs, there were four recurrences—a rate of seven percent. We feel that wire makes early ambulation safe, and that early ambulation reduces hospital stay and all postoperative complications to a minimum.

RIASSUNTO

Riporta i risultati ottenuti in 157 casi di ernia usando fili di acciaio inossidabile ed autorizzando una precoce deambulazione. Sopra 100 casi di ernia indiretta, e' occorsa una sola recidiva (1%): la percentuale e' stata un po' maggiore (7%) nel gruppo delle ernie dirette.

L'uso dei fili d'acciaio consente quindi una degenza molto piu' breve, cio' che riduce ad un minimo le complicazioni postoperatorie e le spese di ospedalazzione.

SUMARIO

El autor reporta una serie de 157 casos de herniotomia en las que se uso el alhambre de acero especial y ambulacion temprana del paciente. De 100 caso de hernia inguinal indirecta ha sida reparadas solo un caso la hernia recurrio. De 57 casos de hernia directa, cuatro recurrieron, o un siete por ciento. En nuestra opinion, el uso del alhambre de acero permite la ambulacion temprana, lo cual reduce las complicaciones post-operatorias considerablemente.

SOMMAIRE

Une série de 150 hernies dans lesquelles on employa des fils d'acier et une ambulation précoce est etudiée. Sur 100 cas d'hernies indirectes, il n'y eut aucune récidive. Dans 57 cas d'hernies directes, il y eut 4 récidives. Nous sommes sous l'impression que les fils d'acier rendent l'ambulation précoce sûre, que le séjour à l'hopital est réduit et que toutes les complications postopératoires sont réduites au minimum.

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Anesthesiology in Canada

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DURING the past decade Canadian anesthesiology has progressed rapidly with a considerable improvement in the mortality and morbidity of the operative cases. This improvement has been due not only to the introduction of new agents and technics but also to the education of physician personnel.

EDUCATION

A vigorous educational program in anesthesiology has been carried on throughout the larger Canadian hospitals emphasizing two courses of training. First there is the two year minimum residency in anesthesiology for the candidate who plans to become a full time specialist in anesthesiology. It has been found advantageous to have these candidates spend each six months of this two year course in various hospitals under different instructors. This rotating plan enables them to attain a more liberal training in the field of practical anesthesiology. The other course in anesthesiology is for the physician who will do both general practice and anesthesiology in the smaller community.

TWO YEAR COURSE FOR THE SPECIALIST

In this course the candidate learns the fundamental principles and application of the anesthetic methods and agents under the following headings:

1. *Inhalation Anesthesia.*

(a) Theories of anesthesia.

(b) The signs of the stages of anesthesia.

(c) Premedication which includes the chemistry and pharmacology of the opiates, barbiturates and belladonna drugs.

(d) Chemistry and pharmacology of the inhalation agents.

(e) Methods of anesthesia which includes the study of open drop and semi-open technics, [illegible], absorption, to and fro, [illegible]

(f) [illegible] and endobronchial technics.

(g) Fire and explosions.

2. *Intravenous Anesthesia.*

(a) Pentothal sodium—chemistry and pharmacology; advantages and disadvantages; its combination with other agents.

(b) Curare or curare-like drugs—chemistry and pharmacology: advantages and disadvantages.

(c) Other uses of intravenous anesthetic agents, such as barbiturates, alcohol and procaine.

3. *Rectal Anesthesia.*

The chemistry and pharmacology of tribromethanol (avertin), paraldehyde and ether: methods of administration.

4. *Analgesia with Local Anesthetic Agents.*

Study of the use of local anesthetics.

(a) Topical—study of the chemistry and pharmacology of the local anesthetic agents and treatment of toxic manifestations.

(b) Regional Block—anatomy of the distribution of the sensory nerves with a view to the performance of successful cervical plexus, brachial plexus, wrist, paravertebral, sciatic and caudal blocks.

(c) Spinal Anesthesia—study of single and intermittent injections: complications and their treatment.

The scope of anesthesiology as practised in Canada is much broader than the administration of the anesthetic agents alone. It is necessary for the anesthesiologist to study fluid and electrolyte balance; transfusion of blood and blood substitutes; oxygen therapy and resuscitation. This knowledge is essential because in many hospitals these services have become the cooperative responsibility of the surgeon and the anesthesiologist, preoperatively and postoperatively. During this two year course of training, the candidate is provided with full maintenance and a small monthly stipend by the hospitals.

COURSE FOR GENERAL PRACTITIONER AND PART TIME ANESTHESIOLOGIST

It is realized that there are many commu-

nities that cannot provide adequate clinical anesthesia for a full time anesthesiologist, and for this group a second course is planned An effort is made to give each interne going out into general practice at least one month of practical anesthesiology In this course he is given clinical instruction in preanesthetic medication, maintenance of an adequate air way during inhalation anesthesia, the use of ether and intravenous pentothal, anesthesia with local anesthetic agents which includes spinal, regional infiltration and topical He is also given some instruction in postoperative care, prevention, detection and correction of pulmonary atelectasis, and in oxygen therapy and resuscitation For slightly larger communities where half the practitioner's time is spent in anesthesiology, six months of training is recommended

CERTIFICATION

The Royal College of Physicians and Surgeons of Canada grants certificates of qualification to specialists in anesthesiology The examinations are held once a year, and are both written and oral The qualifications for the candidates for certification are

(a) Satisfactory moral and ethical standing in the medical profession

(b) Graduation from a medical school approved by Council

(c) A general internship of at least one year in a hospital approved by Council

(d) Study and special training in *anesthesia* of not less than two years, in a hospital approved by Council

(e) Knowledge of the basic medical sciences necessary to the proper understanding of *anesthesia.*

(f) The course of the graduate training shall include an adequate period of instruction of *internal medicine*

(g) Study and/or practice in the specialty for a further period of two years

The candidate's application shall be considered by the Committee on Anesthesia Subject to the approval of this Committee, the candidate may proceed to the examination The examination shall be passed before the Board of Examiners nominated by this Committee, and appointed by Council

Candidates may apply for examination in either the English or French language The examinations shall be conducted according to regulations promulgated from time to time by Council They shall be held at such times and places as Council may direct

The examination consists of the following topics

(a) Human anatomy, physiology, and pharmacology considered in relation to anesthesia

(b) The history, theory, and practice of general anesthesia and of regional anesthesia, the former to include the types "inhalation," "intravenous" and "rectal" anesthesia the latter the types "local" and "block" and spinal anesthesia

(c) Preoperative investigation, preparation and medication, the recognition of postoperative complications and their treatment in so far as they are related to anesthesia

(d) The pharmacology and elementary chemistry of drugs used for, or in association with, anesthesia

Such a system of certification, and the fact that anesthesiology is limited to trained physician anesthesiologists, puts Canada in rather an enviable position in regards to the high standard of anesthesiology These physician specialists have been able to take advantage of the spectacular advances made in anesthesia in the past few years

SUMMARY

Today the Canadian anesthesiologist is as well trained for his work as the surgeon is for his The patient who is to be operated upon may be assured that his chances of a quick, pleasant recovery are almost 100 per cent, as far as the anesthetic is concerned

The anesthesiologist examines the patient before the operation, estimates the blood pressure and general condition and decides on the best anesthetic for the case He takes age, physique and general health into account and weighs the advantages of the different types of anesthesia

RIASSUNTO

Nel Canadà l'anestetista ha la stessa esperienza—nel suo campo—quanto il chirurgo nel suo Il paziente che deve subire una operazione ha quindi la sicur l'aneste

sara' perfetta, quasi piacevole. L'anestetista esamina per conto proprio il paziente prima dell'operazione: valuta le condizioni generali: controlla la pressione del sangue, decidendo in ultimo qual' e' l'anestesia piu' adatta nel caso speciale.

SUMARIO

Hoy en dia, en el Canada, el anestesiologo esta tambien entrenado como el cirujano en su campo de accion. Esto asegura al paciente casi un 100 por ciento de mejoria rapida y agradable, en lo concerniente a la anestesia.

El anestesiologo examina al paciente antes de la operacion, para determinar la condicion del paciente y decidir el tipo de anestesia mas beneficioso para el paciente, segun su edad, desarroyo fisico, y estado de salud.

SOMMAIRE

L'anesthésiologiste au Canada est de nos jours bien entraîné pour sa tâche, comme le chirurgien l'est pour la sienne. Le malade qui doit être opéré sera assuré qu'il se rétablira vite, que sa convalescence sera agréable et que l'anesthésique l'incommodera peu.

L'anesthésiologiste examine son malade avant l'opération, se renseigne sur la pression artérielle et sur l'état général du malade. Il prend l'âge du malade, étudie son etat général et choisi l'anesthésique le plus approprié pour le cas.

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Surgical Procedures in the Treatment of Peptic Ulcer*

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THE surgical treatment of peptic ulcer has undergone many modifications in the past century Indirect or palliative operations such as gastroenterostomy and pyloroplasty were first advocated and then discarded because of the high percentage of recurrences Until five years ago, subtotal gastric resection was universally accepted as the procedure of choice In the hands of the experienced surgeon this operation gave excellent results with a low mortality However, the occasional operator found it a difficult technical feat and his results were often poor because of inadequate resection In 1943 Dragstedt revived the old interest in vagus nerve resection as a treatment for peptic ulcer He has continued to report good results with this operation but others have found that the complications and unpleasant after effects of vagotomy decrease its value considerably

The purpose of this paper is to outline the requirements for a satisfactory surgical procedure in peptic ulcer and to evaluate the relative merits of the two widely used operations

The etiology of peptic ulcer is still unknown but it is well recognized that the continued secretion of acid gastric juice is the important factor in chronicity The secretion of gastric juice is in three phases, the psychic phase mediated by the vagi, the direct chemical phase due to the presence of food in the stomach, and the hormonal phase which is controlled by the cells of the pyloric antrum The effect of this acid secretion is modified by the neutralizing action of the alkaline duodenal contents and by the diluting effect of food

The modern surgical approach to the ulcer problem is directed toward eliminating or controlling the acid secretion and thus allowing the ulcer to heal Vagotomy does this by removing the psychic stimulation Gastrectomy attempts to excise the acid secreting portion of the stomach and to eliminate the hormonal effect of the pyloric antrum Both operations have disadvantages and neither represents the ideal form of therapy

SUBTOTAL GASTRIC RESECTION

Most experienced surgeons have been well satisfied with subtotal resection The mortality has been low, the morbidity minimal and the end results fairly satisfactory With a personal experience of one thousand resections I can say that these patients on the whole are the happiest of any group undergoing major surgery

In this series the mortality rate has averaged 2 5 percent This includes cases of resection for perforation, for massive hemorrhage, and one stage operations for calloused penetrating ulcers Postoperative complications have been no more common than in other major abdominal procedures Temporary edema of the stoma has occurred in less than one percent of the cases, wound infection in three percent and duodenal fistulae in two percent

The end results have been satisfactory in over 90 percent of the series About five percent have symptoms characteristic of the "dumping syndrome" and probably as high as three percent develop recurrent ulcers We have only been able to prove the existence of a stomal ulcer in one percent of the series

The technic of resection has been well standardized A satisfactory operation must fulfill the following requirements

1 At least 75 percent of the stomach must be resected
2 The pylorus must be completely removed
3 A posterior, no loop gastro jejunostomy should be performed, leaving a small stoma

Despite the fact that the technic does not vary from case to case, the end results of operation are not always identical We have found as a rule that where a lar used penetrating ulcer is present the results of gastrectomy are most satisfactory. The cases of persistent postoperative symptoms and dumping syndrome usually occur in thin, apprehensive individuals who give a long history of dyspepsia but in whom little pathology is found at operation. These patients often show nutritional disturbances with a glucose tolerance curve which rises rapidly to 200 mgm. percent but falls to 50 or lower. Despite this, I am convinced that this syndrome is largely psychogenic and is found primarily in neurotic individuals.

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* From the Dept of Surgery McGill University and Royal Victoria hospital Montreal Canada

Recurrent stomal ulceration tends to occur in patients with a highly acid gastric juice in whom a relatively high residual acid persists after resection.

Reviewing this large experience, it is possible to state without fear of contradiction that subtotal resection has been a most valuable addition to the therapy of ulcer. When properly done it is safe and cures over 90 percent. It is not perfect. Some postoperative symptoms and recurrences will arise and if a better method of treatment is available it should be used.

VAGOTOMY

Removal of the vagus innervation of the stomach as a treatment for ulcer is not new. This procedure has been advocated and later discarded on at least three occasions in 1907-14, 1920-24 and 1920-34. In 1943, after a careful prelimina[illegible] [illegible]stigation, Dragstedt
[illegible]ain recommended [illegible] ation. His enthu-
[illegible] was contagious [illegible] y surgeons be-
[illegible] once to perform [illegible] ection as the
[illegible] n of choice for [illegible] first reac-
[illegible] his proposal w[illegible] and see.
[illegible] ction was too [illegible] method
t[illegible] night in order [illegible] oper-
at[illegible] been foun[illegible] the
pas[illegible] courage[illegible]
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opposed to the use of vagotomy for gastric ulcer because of the danger of malignancy.

In this group of 40 cases, 21 were carried out transthoracically and 19 through an abdominal approach. There were two deaths, a mortality of five percent.

The results of operation were good in 25 cases, poor in nine and in four cases the ulcer recurred. This is a small series and perhaps all were not complete vagotomies. Nevertheless, the results have been much poorer than those obtained with subtotal resection.

Our chief postoperative problems have been gastric atony and diarrhea. The use of suction for five to seven days after operation has helped to prevent this to some extent but not entirely. These symptoms may persist for many months and in these cases the convalescence has been unduly prolonged. It is only fair to emphasize that vagotomy does lower the acid secretion, and when the patients finally get over their postoperative complications they are usually free from ulcer symptoms, eat well and tend to gain weight. There is, however, a group which continues to complain of weakness, nervousness and dyspepsia even though their ulcer pain is relieved. There are many reports in the literature which confirm the fact that the mortality from vagotomy is low and the results good in many cases. Recurrences are about as frequent as following adequate resection.

The relative merits of subtotal gastrectomy and vagotomy have been carefully discussed by the surgical staff of the Royal Victoria hospit[illegible] We have come to the conclusion that
vago[illegible] is neither as useful nor as satis-
fact[illegible] operation as gastrectomy. It is
true [illegible] r experience has consisted of a
larg[illegible] of resections and a small series
of v[illegible]. Nevertheless, we have reached
the [illegible] conclusions:

1. [illegible] gastric resection is the opera-
[illegible] hoice in gastric and duodenal

[illegible] should be used in cases of
[illegible] cer following adequate re-

[illegible] should be combined with sub-
[illegible] ion where the gastric acid is
[illegible] over 100 units free HCl
[illegible] should never be used for gas-

tric ulcer because of the large percentage of wrong diagnoses In the case of perforation or massive hemorrhage we feel that vagotomy is contraindicated

SUMMARY

Although subtotal resection is far from the perfect operation for gastroduodenal ulcer, in our experience it has proven the most satisfactory The mortality is low, the postoperative course free from complications and the results satisfactory with a low recurrence rate

Our experience with vagotomy is disappointing because of the frequent postoperative complications of distension and diarrhea and because deaths and recurrences have occurred in our rather small series We feel that subdiaphragmatic vagotomy has a definite place in the surgical treatment of ulcer but it should be reserved for the small group of cases in which gastrectomy has proven inadequate

RIASSUNTO

Benche' la resezione subtotale non sia l'operazione ideale per le ulceri gastroduodenali l'A ritiene che questa offra i risultati piu' soddisfacenti La mortalita' e' bassa il decorso postoperatorio privo di complicazioni le recidive rare Nella piccola serie di vagotomie eseguite dall'A le complicazioni postoperative (diarrea, distensione, etc) sono state invece relativamente frequenti, come frequenti sono state le recidive ed i casi di morte Con cio' l'A non elimina la vagotomia della cura chirurgica delle ulceri ritiene che vada riservata ad un piccolo gruppo di casi nei quali la gastrectomia non ha raggiunto un risultato soddisfacente

SUMARIO

De acuerdo con el autor la reseccion subtotal en el tratamiento de las ulceras gastroduodenales, aunque no es un metodo perfecto, es en el presente el mas satisfactorio La mortalidad con este metodo es baja su curso post operatorio es libre de complicaciones, y los resultados en general son muy satisfactorios, por cuanto la incidencia de recurrencias es muy pequena En cambio la vagotomia en nuestra poca experiencia ha acarreado mas mortalidad y las complicaciones post operatorias han sido mucho mas frecuentes especialmente la distencion abdominal y la diarrea En nuestra opinion la vagotomia subdiafragmatica se debe de reservar para el pequeno grupo de casos, en los cuales la gastrectomia ha dado resultados inadecuados

SOMMAIRE

Quoique la resection gastrique subtotale soit loin d'etre une operation parfaite pour l'ulcere gastrique duodenal Elle est, d'apres notre experience la plus satisfaisante La mortalite est basse et la periode postoperatoire presente peu de complications Les resultats sont satisfaisants et les recidives peu frequentes

Notre experience avec la vagotomie n'est pas encourageant, vu les frequentes complications postoperatoires la dilatation, les diarrees, et aussi vu les deces et les recidives qui sont survenus dans notre serie Nous sommes sous l'impression que la vagotomie sous diaphragmatique a un emploi défini dans le traitement chirurgical de l'ulcere gastrique Mais elle doit être reservee pour le petit groupe de cas dans lesquels la gastrectomie est inadequate

Cytology and the Menopause*

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MANY women when they reach, go through, and pass the menopause manifest symptoms such as flushes, chills, sweats, vertigo, cardiovascular disturbances, insomnia, headaches, and irascibility. These may cause the menopausal female a considerable amount of grief and in some cases may result in serious consequences. In some women there is little disturbance beyond the cessation of menstruation. In others, there is a profound mental and physical upset with the unpleasant hot flushes as the predominating feature. The frustrations and sublimations of reproductivity for women in our present culture confuse the menopausal state. Many women abruptly seek another pregnancy to reexperience motherhood. There is in the unconscious mind a sense of frustration, inner tension and the need to escape. This desire to escape may go beyond reality, and it may lead to insanity. The importance of a complete evaluation of the menopausal patient cannot be stressed too strongly.

It is undoubtedly true that there may be irregular and/or excessive bleeding at this time. This bleeding is, in most cases, caused by endocrine imbalances which are so common at this stage of life. Some workers believe that in many instances the last periods of bleeding are in anovulatory cycles. However true this may be, the likelihood of carcinoma, either of the cervix or the fundus, must always be the first consideration. The possibility of malignant disease should always be definitely ruled out before abnormal bleeding is dismissed as being of functional origin. At this time, there is a drop in the production of ovarian hormones, and so common has become the use of estrogenic substances in the replacement therapy of the symptoms of the menopause, that in many instances oral and parenteral use of these hormones is prescribed without a proper evaluation of the woman's physical and mental state. Control is often [illegible] and cases are on record where women took estrogen in various forms over a period of years with no control or reevaluation.[1,5]

MENOPAUSAL PATIENTS MAY BE DIVIDED INTO THREE GROUPS[8]

1. The syndrome may be purely one of autonomic imbalance brought on by the stress and strain of this period.
2. It may be due entirely to declining ovarian function with attendant hyperfunction of the pituitary gland.
3. The syndrome may be due to a combination of the first two, with or without other coincident diseases.

Estrogenic therapy in proper dosage is attended by good results in the second group, but often results in disappointment in patients of the first group. These women are more likely to respond to psychotherapy and sedation, which would not be sufficient in group two. It is often difficult to determine from subjective symptoms alone into just which group a patient falls. The simplest test to aid in the differential diagnosis is the vaginal smear. Papanicolaou and Shorr showed that the cytologic picture of the menopause can be transformed by adequate amounts of estrogen to the smear found in the follicular phase of the menstrual cycle.[19-20]

The vaginal smear may be used to differentiate between the menopausal symptoms of estrogen deficiency and the pseudomenopausal syndrome caused by mental stress and strain with its associated autonomic imbalances. If the smear shows a high cornification (indicative of the presence of estrogen) it is not likely that added exogenous estrogen will offer the patient much relief. In such cases psychotherapy is indicated. Another useful function of the smear is as an indicator of the efficacy of the administered estrogen in one of its effects at least, namely on the lower genital tract.

In an attempt to attain a more scientific study of the climacteric and the hormonal and morphological changes which take place at

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[illegible]

this time, Papanicolaou and Shorr studied the vaginal smears of a large series of menopausal women. They found that the administration of estrogen to menopausal women with symptoms brought about a gradual subsidence of the severity of the symptoms together with changes in the smear towards the high follicular type. These men classify the menopausal smear into six types:[20]

1. *The menopausal atrophic smear:* This is the type that indicates absent or minimal ovarian activity, and advanced atrophy of the genital tract. Pus, deep basal cells, and blood cells are present, with a moderate amount of mucus, and a profuse bacterial flora. The atrophy of the organs after the menopause is most severe when the ovaries are removed surgically. In these cases the vaginal smear will show numerous compact basal cells from the deep layers and few superficial cells.

2. *Intermediate type:* When the atrophy is less severe the smears are variable. In this group many deep cells are present, but superficial cells predominate. These are folded, irregular, and densely grouped. The nuclei are relatively large; there are many leukocytes and bacteria. There is a moderate amount of mucus, and red blood cells may be present.

3. *Mucous type:* In this type there is an excessive amount of mucus. There is usually some blood and fibrination. Deep cells may prevail or may be less than the superficial cells. Large amounts of pus cells and bacteria are present.

4. *The Premenstrual type:* This type of smear bears a strong resemblance to the normal premenstrual smear. The cells are irregularly folded with large nuclei, and are generally seen in clumps. Pus cells and bacteria are abundant. Mucus is moderate, but deep cells are rare.

5. *Bacillus Vaginalis type:* Here is found a rich growth of a bacillus resembling that of Doederlein. Superficial cells with relatively large nuclei predominate. Deep cells may be present or absent. Fragmentation of cells is common with large numbers of free nuclei. Pus and mucus are present and occasionally some red blood cells are seen.

6. *Pseudoleukopenic type:* Here there is a pronounced leukopenia. Most of the cells are of the superficial variety, irregularly and heavily grouped. The nuclei are relatively large although small nuclei may prevail in some instances.

Under estrogen therapy the results are uniform whatever the original type of smear may be. The blood and pus decrease. The appearance is noted of large flat well-outlined cells, many of them cornified with pyknotic nuclei. These are isolated or are in small groups. The smear takes on a more clean-cut appearance which permits ready differentiation. Often there is an excessive secretion of mucus, which is one of the most typical evidences of reaction to the administration of estrogenic substance.

The changes induced in the postmenopausal smear by the administration of estrogen are comparable to the alterations in the midmenstrual phase of the normal menstrual cycle when the follicles are reaching their maximal development prior to ovulation. These changes resemble even more the periodic appearance of the follicular picture in the postmenopausal state. Papanicolaou and Shorr describe a case where during the period of observation, before the institution of therapy, the menopausal smear was spontaneously and gradually replaced by a follicular type of smear which lasted for about 12 days. A short period of bleeding followed and the smear reverted to the original type. The menopausal symptoms which had been severe disappeared as long as the smear was of the follicular type and reappeared after the regression.

Adequate therapy duplicates these changes. This furnishes a therapeutic goal, namely the induction and maintenance of a follicular type smear with its associated symptomatic improvement. The correspondence between the smear and the degree of relief is however relative, so that it cannot be stated that any particular phase in the changing smear is related to a definite intensity of symptoms. In all cases the optimum smear, that which corresponds to the follicular phase of the cycle, is accompanied by maximum relief.

By using the vaginal smear as a guide it was found that frequently doses of estrogenic hormone were being used which were too small for the individual case, which explained their apparent ineffectiveness. Regulation of therapy by symptoms alone is not entirely accurate as various systems respond differently. There is usually good correlation between the degree of smear change and the extent of the relief of symptoms, particularly in severe cases. It is true that in some instances there is symptomatic relief before the optimum smear change is reached. This may be welcome from the patient's standpoint at the moment, but in the long run it is less desirable than the complete restoration of the physiologic state prevailing with optimum function of the hormone.

Papanicolaou and Shorr believe that the induction of the follicular smear is the more reliable index of success in the treatment of the menopause, and advise the following routine: (1) careful and complete physical examination. (2) A small number of control smears before therapy is instituted; (3) treatment is begun and the patient is followed with weekly smears; (4) dosage is increased until a satisfactory smear is reached; (5) patient is placed on a maintainance dose; and (6) adjustments in dosage should be tried, as well as periodic temporary withdrawals of therapy.

Mack[12,13] approached this matter from a different angle, and while some of his findings are similar to those of Papanicolaou and Shorr, he differs in some of his final conclusions. He takes the smears by rubbing a cotton swab against the vaginal wall. Staining is accomplished by laying the slide face down over a shallow dish containing Lugol's iodine. The iodine vapors arise insensibly and the smear is stained in two to three minutes. Microscopic examination may be carried out immediately. This test is based upon the fact that the presence of glycogen in the vaginal epithelium depends upon estrogenic activity.[23] This relationship is well established. The staining technic is based upon a specific color reaction between glycogen and iodine. The author claims for this technic a simplicity not shared by the complicated and time consuming method of Papanicolaou. The iodine method does not require microscopic skill in identifying the cells by their staining reactions.

Basing his classification on the glycogen content and the intracellular distribution, Mack divides the smears into four groups:

1. Complete glycopenia—The smear contains only small yellow cells of varying shapes with large amounts of cellular debris. In the extreme grade there is marked paucity of epithelial elements.

2. In this group there are more epithelial elements. Irregular deposits of glycogen are noted at the cell margins or scattered diffusely through the cytoplasm. Small deep cells as well as some yellow cells are also noted.

3. A further increase in cell numbers is evident. The cells are larger and more regular. The cytoplasm has a light brown color. Many noniodophilic are also present.

4. This grade of smear is made up almost entirely of large, flat, deeply stained, brown, iodophilic cells present singly or in large clumps. This smear represents maximal estrogen effect and corresponds to the smear in the follicular phase.

Smears from vaginae with normal glycogen are recognizable even microscopically by the deep brown color of the stained slide. The microscope shows a preponderance of large flat polygonal cells with rich brown cytoplasm. The nuclei are small, round, translucent, unstained bodies. Various amounts of smaller rounder cells are also noted. The nonglycogenic cells are unstained or light yellow. These are irregular in size and shape, and have poorly defined nuclei. Variations in the proportions of iodophilic and noniodophilic cells is noted in the follicular phase. Rakoff[21] found that an increase in the intensity of the glycogen stain is found at the mid-cycle.

In the menopause and prepuberty there is glycogen deficiency in the vagina. The smears show an absence of the rich brown cells. These smears have a lemon yellow or light brown color. In extreme grades of vaginal atrophy the smears show varying amounts of yellow squamous cells and much cellular debris. Many small round cells are noted. In less advanced atrophy the glycogen deficiency is noted by the presence of mottled cells with small irregularly distributed brown deposits at the cell margins and in the cytoplasm. The brown color rarely involves the entire cell as it does in sexual maturity. The few cells which stain diffusely are smaller than usual and stain less intensely than in the high estrogen states. Unstained irregularly shaped cells typical of the superficial layer are also present in abundance

Mack found that there is sometimes a lack of vaginal atrophy as well as a lack of glycopenia in the early symptom producing phases of the menopause, and feels that this indicates a limited value of the vaginal smear as a guide to diagnosis and therapy However the sensitivity of the vagina to small amounts of estrogen suggests the usefulness of the smear in controlling therapy of senile and juvenile vaginitis as well as in determinations of the relative potencies of various commercial preparations as judged by their effect on the vaginal mucosa of women with advanced atrophy

Salmon and Frank[22] found that in only about 40 percent of castrates and postmenopausal women were uniformly atrophic smears noted In 30 percent of cases variations from an atrophic to a positive or follicular smear occurred In the remaining 30 percent of women, follicular type smears were found even when taken daily over varied periods of time These workers concluded that in untreated cases there does not seem to be an exact correspondence between the severity of the symptoms and the character of the smear However following the administration of estrogenic substances striking changes are noted in the vaginal smears concurrently with the amelioration of symptoms Recurrence of the symptoms parallels the gradual return of the smear to its preliminary state

Novak[16] expressed the opinion that, as in the case of the endometrium, the postmenopausal smears are not always atrophic and retrogressive, and that evidence of postmenopausal estrogenic activity will at times be encountered in the vagina as well as in the uterus

Greenblatt[8] agreed with Papanicolaou and Shorr that the vaginal smear is not only an excellent guide to diagnosis and therapy of menopausal patients, but that it should always be used where treatment is under consideration

Bennett and Telinde[4] investigated the efficacy of implanted estrogen pellets in the treatment of the menopause and correlated their clinical findings with vaginal smears These workers noted vaginal smears from untreated castrated women which showed an abundance of large flat epithelial cells such as are usually found in women with an abundance of estrogen These men admitted that in general the great majority of postmenopausal women with symptoms have smears suggestive of estrogen deficiency, and that under the influence of implanted estrogen the smear changed to the follicular or estrogenic type

In some cases, relief of symptoms was noted without any marked change in the smear Bennett and Telinde expressed their belief that the dosage needed to relieve symptoms is less than that needed to alter the vaginal epithelium, that it is not at all necessary for the practitioner who is treating menopausal symptoms to follow the vaginal smears, and that the optimum smear type is not the ideal or final goal of therapy They stated that it is a better rule to be guided by clinical signs

Neustadter and MacKenzie[15] found that while the vaginal smear is of help in the diagnosis of menopausal syndromes, they had cases where estrogen produced symptomatic relief while the smear showed a predominance of atrophic type cells

Severinghaus[24, 25] comments that it is not absolutely necessary to study vaginal smears in the clinical management of women with menopausal symptoms Problem cases can, however, be studied in this way and doubts about the presence or absence of estrogen can be resolved with objective criteria The change from an inactive to an active epithelium indicates either production of estrogen by the patient, or administration of such a substance in adequate dosage

Ulfelder and Meigs[26] concluded that in a patient with symptoms suggestive of the climacteric the smear will reveal whether there is concomitant vaginal atrophy It will show, after treatment of a patient with estrogen has failed to produce clinical results, whether a physiologic effect has been produced, that is, whether the medication has been taken as directed and whether it is being metabolized and utilized in a normal fashion

That the cytology smear is useful in the diagnosis and treatment of the menopausal syndrome is undoubtedly true The original and most favorable observations of Papanicolaou and Shorr regarding the value and the high degree of accuracy of this method have not, however, been confirmed by all workers. Opinions vary, and the true status of the smear in this problem has not yet been attained. Papanicolaou, Shorr and Greenblatt expressed the belief that the smear is an extremely accurate indicator of the true menopausal state. This belief merits careful consideration as well as critical analysis as to the accuracy, value, and practicability of the smear. There is no single typical postmenopausal smear.

Papanicolaou and Shorr described no less than six smear types which may be encountered in the menopausal and postmenopausal states. These same smear types are found in cases of amenorrhea. The menopausal atrophic is common in primary amenorrhea, often associated with an infantile uterus. In the secondary amenorrheas all the other types of smears are found, but the premenstrual and bacillus vaginalis varieties are the most common. The resemblance of the smears in the menopause and in amenorrhea, the similarity of the responses to hormonal therapy, and the existence of postmenopausal cyclic changes tend to break down the sharp distinctions generally held to exist between them. From the morphological standpoint it is often difficult to classify cases in one group or the other. The final goal of therapy is the same whatever the original smear type may be. In addition Papanicolaou warns that certain factors such as sexual intercourse or infection may increase the number of leukocytes or the amount of mucus and may affect the staining. In considering smears one should pay attention to such factors, lay special stress on the morphological changes affecting the epithelial cells, and should not rely on the staining reactions alone.

Studies of the menopausal state within recent years have indicated repeatedly that cessation of the menses is not accompanied by an abrupt disappearance of estrogen. Even in surgical castrates the atrophic smear may not develop for some time. Why some women develop an atrophic type of smear soon after the menopause and others do not, is a matter of [illegible]. Careful questioning of women who [illegible] cornification after the menopause [illegible] the possibility of hormonal therapy. The source of this estrogen is a matter for much speculation. It has been suggested that the ovaries continue to secrete small amounts of estrogen after the menses have ceased, that the adrenals or some other glands take over the production of estrogen after the ovaries give up the job, or that estrogen is derived from food in sufficient quantities to reach an effective concentration in women whose inactivating mechanism is, perhaps, not up to par. Many workers have found smears showing estrogen effect in postmenopausal patients, and feel that the vaginal smear is not, therefore, of as great value as Papanicolaou and Shorr claimed.

Glycogen in variable amounts is found in all age groups of women who have passed the menopause. Mack feels that the glycogen index is a more sensitive indicator of estrogenic activity than is the stained vaginal smear. Willson and Goforth[23] found that glycogen increase preceeded change in cell morphology in their investigations of the effects of stilbesterol on the vaginal mucosa as determined by the iodine vapor method. Studies by numerous investigators along these lines seem to indicate that the postmenopausal estrogen stimulation which normally persists for some time after the natural menopause is reduced by oophorectomy. This suggests that the ovary may be the main source of estrogen even after menstruation has ceased.

After the cessation of ovarian activity the regressive process in the vaginal mucosa, which is reflected in the vaginal smear, does not occur uniformly. The process is patchy. Some parts of the vaginal mucosa regress more rapidly and more completely than others. Furthermore the reparative or proliferative process which occurs in response to estrogen administration likewise does not take place uniformly, some parts of the mucosa showing more advanced degrees of proliferation than others. In addition individual patients differ in their response to the estrogenic hormone. These observations may be the reason for the finding of cornified and atrophic basal cell types in vaginal smears at the same time, a condition which is not too rare.

The finding of a smear picture other than the atrophic type in a woman of 50 years of age or more is difficult of evaluation and makes for confusion. Most workers will agree that some women who have not menstruated for years do not have an atrophic smear. Some workers go further and state that it is *not uncommon to find cyclic changes in women who have been showing atrophic smears*.[20] The smear changes spontaneously to the follicular type, there may be some microscopic bleeding, and the smear regresses gradually to the atrophic type. This complicates the picture because if the smear happens to be taken during one of these phases, a mistaken impression of the true condition will be obtained. It must be kept in mind that the atrophic smear is found only in extreme cases, and that less advanced degrees of atrophy usually prevail. The findings of hypertrophic and hyperplastic endometria in women far beyond the menopause may certainly be linked up with the matter under present consideration.[18] Whatever the underlying causes are, it is certain that the atrophic endometrium and the atrophic vaginal smear are not the inevitable accompaniments of the menopause.

Any woman at any age may have cancer of the genital tract. One of the most reprehensible acts in medical practice is the treatment of women complaining of abnormal or unusual vaginal bleeding with pills, injections, or reassurance, without first doing a careful and thorough physical examination. It is a common occurrence in every large clinic to have a woman come in with far advanced, incurable carcinoma of the cervix, and the story that the doctor patted her on the back, told her not to worry, that she was going through the menopause, and that it was normal to have irregular bleeding at that time.

It has been shown that a vaginal or cervical smear, properly taken, well stained, and expertly interpreted, will detect genital cancer in the female in an amazingly high percentage of cases, even before there are any symptoms or clinical lesions.[2] The smear is easy to take. The glycogen iodine staining technic is not suitable for this type of work and a good smear stained by the Papanicolaou method is necessary. This is an important reason why every woman who complains of menopausal symptoms, in fact every woman whether she has symptoms or not, should have this test.

It is common for patients who are receiving estrogenic therapy to experience abnormal vaginal bleeding,[1] this may take place either during the course of therapy, or when the hormone is withdrawn. The fact that a woman has been *receiving estrogenic therapy is no* guarantee that the bleeding is benign in nature, and that a malignant lesion may not be at the root of it. Since such bleeding is so common, and the ruling out of cancer involved hospital admission, many practitioners have "observed" such patients. In many instances no ill effects resulted from such a procedure. However not a few cancers have been missed until they were too far advanced for successful therapy because of a policy of watchful waiting where thorough investigation was indicated. If such patients were carefully checked by the cervical or vaginal smear, many cancers would be detected at a stage where therapy might be curative.

We do not wish at this point to enter into a discussion either of the possible effect of estrogen as an initiator of malignant neoplasia, or of its possible activity as an augmenter of the growth once it is established. However the fact that many reliable *investigators do* ascribe such properties to the hormone make it imperative that all precautions be observed.[3, 6, 9, 14] Auchincloss and Haagensen warn that because of its potent growth producing effect, estrogen should never be given to any woman without careful initial and repeated clinical examination of the breasts.[1] Surely the same is true in the case of the uterus,[5, 11] for no woman who is to receive estrogenic therapy should fail to have repeated careful examinations of the genital tract. In the cytology smear we have an accurate means of augmenting and supplementing clinical examination. Any abnormal growth activity, be it caused by the estrogen or not, will be reflected in the smear at a very early stage, long before there are any clinical signs. The indication will thus be found that the estrogenic therapy had better be discontinued, and careful reevaluation of the patient's condition be carried out.

Workers including Papanicolaou, Shorr, Telinde, Bennett, and Sevringhaus, have noted that many patients with menopausal complaints obtain good clinical relief before the optimal change in the smear has been reached. Papanicolaou and Shorr, while admitting the truth of this finding, feel that a more physiological state is reached when the vaginal smear changes to a follicular type. Other physicians have for years treated menopausal symptoms without recourse to the vaginal smear. Their patients have been in many cases relieved of their distressing symptoms and it is claimed by some that the alleviation of symptoms is the most practical goal and guide, even though it may not be the most objective or scientific.

Whatever the original smear, be it of the extremely atrophic type or one of the lesser varieties, the effect of administered estrogen will be the same.[27] The exogenous estrogen will mediate a change in the vaginal smear so that it will eventually come to resemble some type of picture such as is found in the follicular phase of the menstrual cycle. The degree of morphological change, of cornification, will depend on the amount of estrogen taken, the kind of estrogenic substance, the concentration of the hormone which reaches the genital tract, and the receptivity of the local tissues to the substance. It must be remembered that the fevers, the marked wasting states, local infections such as trichomonal vaginitis, all have a bearing upon the reaction of the tissues to estrogenic stimulation.

While there may not always be an exact relationship between the original vaginal smear and the severity of the symptoms, under estrogen therapy there is a definite parallelism between the change of the smear and the improvement of symptoms, with return of the symptoms when the smear regresses to the original or atrophic type. This is an important factor in the evaluation of therapy.

Cytology smears in postmenopausal women may be divided into three groups: (1) High estrogen type, (2) Intermediate, (3) Atrophic variety. While not every postmenopausal woman manifests an atrophic smear, this is not a sufficient reason to consider that cytologic study is valueless when dealing with the menopause. Whatever the state of the smear it is of some significance. It is considered by most competent observers that the degree of vaginal and cervical cornification is [illegible] an indicator of the body [illegible]

If the vaginal smears of a postmenopausal female with symptoms consistently show a high degree of cornification, it is unlikely that the basic cause of her troubles lies in hormonal deficiency, and it is doubtful that added estrogen will help. Sedation and psychotherapy would be of more value. If no cytologic study is made then much effort will be expended in replacement therapy until its continual failure leads the physician to seek some other cause of the woman's troubles. Intelligent use of the smear can thus save much time and expense.

Furthermore when one considers the recent work that has been done implicating the estrogens in the etiology of genital cancer, one wonders at the wisdom in giving a woman who already has a high estrogen level more of the hormone.[10] Not only is it our belief that in these cases estrogen should not be prescribed, but that the high postmenopausal degree of cornification might constitute a danger signal, warning that such a patient should be watched carefully for the possible development of a malignant condition of the genital tract.

If a woman with menopausal complaints manifests an atrophic smear or one indicative of low estrogen her symptoms may be due to hormonal deficiency, they may have mainly a mental or nervous background, or a combination of factors may be involved. In some cases large doses of estrogen are attended by neither change in the smear picture nor any relief of symptoms. There may be several causes for this. The hormone may be inactivated before it has time to act. Or there may be some local condition which inhibits the action of the estrogen. When such cases are encountered search must be made for the reason for the lack of response, and therapy other than hormonal should be utilized.

In other instances estrogenic therapy will bring about an improvement in the symptoms but will have no effect on the smear. There are several possible explanations. The vaginal epithelium may for some reason be refractory to estrogenic stimulation. In others there may be a lag in the cytologic response. Or, in patients with a marked neurotic background, the psychological effect of some form of therapy may in itself be enough to bring about some symptomatic improvement

If a woman with menopausal symptoms and an atrophic smear is given enough estrogen to bring the smear to a follicular picture and yet the symptoms are not relieved we consider that this is an indication that the primary cause of her symptoms is not the lack of estrogenic hormone In such cases some other form of therapy should be considered In patients suffering from a deficiency of estrogen change from an atrophic to a follicular type smear should be accompanied by an improvement in the clinical picture If this does not occur it is pointless to carry on with estrogenic therapy alone changing from one form of oral therapy to another, and finally attempting parenteral treatment Such a procedure is a needless waste of time effort, and expense *The failure of symptomatic improvement to be* realized when the optimal smear picture has been attained *is a clear indication that the* fundamental background of the complaints is not to be found in the hormonal insufficiency alone, although this may be part of the syndrome

The vaginal and cervical cytology smear is no cure all It is not a substitute for clinical judgment and acumen in the management of the symptomatic menopause It has a certain role to play, an important and a definite role, and only when this is clearly understood and the limitations of the test fully realized, can its marked advantages be fully and wisely utilized. The cytology test, in common with *other laboratory procedures, will not make up* for clinical and personal inadequacy In the hands of men who expect it to think for them any test will be a failure It is an irrefutable truth that there are many cases where the proper intelligent, and controlled use of the cytology smear can be of great and often vital assistance in the logical and correct appraisal of a patient and her situation Keeping these conditions in mind we believe that every woman who consults her physician with menopausal complaints with any complaints or with no complaints, should have the benefit *of a cytology test before any further measures,* be they investigative or therapeutic, are undertaken

SUMMARY

1 The menopausal syndrome combines symptoms of hormonal, mental, and physical origin *It is essential to differentiate between* these The cytology smear is of assistance in distinguishing symptoms which are caused by hormonal deficiency from those whose origin is mainly psychic In this way a more intelligent approach to the problem may be made

2 While there is no single constant menopausal or postmenopausal smear, a good indication of the growth activity of the genital tract *can be obtained from the study of the* vaginal and cervical smear

3 Whatever the original postmenopausal smear may be the administration of estrogenic substances should have certain effects, and by examining the vaginal smears we have a guide to the efficacy of therapy

4 While it is true that symptomatic relief may be attained before the optimal smear picture is reached, some workers *consider that the* follicular type smear is indicative of a more *physiological state, and that its attainment* should be sought

5 It is not considered advisable to administer estrogen to a woman who already has a high body level as indicated by the smear The reason for high estrogen levels in postmenopausal women is not known Several opinions are presented

6 The role of the cytology smear in the detection of preclinical cancer of the uterus is stressed Every woman should have the *test periodically The iodine vapor technic is* not suitable for cancer diagnosis and a smear properly stained by the Papanicolaou stain is essential

CONCLUSIONS

While the cytology smear is not an infallible guide in the management of the menopause, while it is not a substitute for clinical judgment and acumen, while it is not indispensable, we believe that the intelligent use of the vaginal and cervical smear is of great help in the proper appraisal and management of menopausal *patients, and in some* cases it may be of invaluable assistance We *feel that the test should be used 1 Before* therapy to gain some idea of the growth activity of the genital tract, and to attempt to determine the approximate body level of estrogen; 2. During therapy to check the efficiency of the therapeutic agent; 3. After completion of therapy to gage the effect of the withdrawal of therapy, on the smear as well as on the symptoms; and 4. At all times the smear should be carefully examined so that any hyperactive, abnormal, or neoplastic changes may be spotted, and reevaluation of the patient carried out to guard against the development of a malignant lesion.

RIASSUNTO

1. La sindrome clinica da menopausa comprende un'origine psichica ed ormonica. Onde differenziare la causa dei sintomi, e' opportuno ricorrere ad un esame citologico della secrezione vaginale, capace di rivelare una deficienza ormonica.

2. Benche' non esista un quadro microscopico definito, costante, nel periodo della menopausa o successivo alla menopausa stessa, lo studio degli strisci vaginali e cervicali consente un apprezzamento abbastanza preciso dell' attivita' funzionale degli organi genitali.

3. Dato che la somministrazione di ormoni estrogenici ha degli effetti fisiologici definiti, l'esame degli strisci vaginali puo' guidare la terapia in base alle successive modificazioni del quadro microscopico.

4. Benche' sia possibile attenuare i sintomi clinici prima di raggiungere un optimum negli strisci vaginali, taluni AA. ritengono che sia bene raggiungere negli strisci vaginali il quadro microscopico di un'attivita' follicolare (questa corrisponderebbe ad una migliore condizione fisiologica).

5. Non e' consigliabile la somministrazione di sostanze estrogene a pazienti aventi gia' un elevato tasso, dimostrabile attraverso gli strisci vaginali. Manca ancora una spiegazione precisa per l'elevato livello delle sostanze estrogene nel periodo successivo alla menopausa. L'A. riporta parecchie teorie al riguardo.

6. Notevole importanza assumono gli strisci vaginali anche nella diagnosi precoce del cancro. Ogni donna dovrebbe essere sottoposta periodicamente a quest' esame. Gli strisci, colorati con la tecnica di Papanicolaou, rappresentano il metodo migliore, superiore alla prova dei vapori di iodio.

SUMARIO

1. El sindrome de la menopausia combina sintomas de origen hormonal, mentales, y fisicos; es esencial el diferenciarlos. El examen citologico ayuda en la diferenciacion de los sintomas debidos a la insuficiencia hormonal de los que son puramente psicologicos.

2. El examen citologico de la vagina y del canal cervical ofrece un buen indice de la actividad del aparato genital.

3. La administracion de substancias estrogenicas producen ciertos efectos en la citologia del canal genital por lo tanto el examen citologico es de valor en la demostracion de la eficiencia de dicho tratamiento.

4. En el tratamiento hormonal se debe de tratar de obtener, de acuerdo con ciertos autores, el tipo folicular citologico por cuanto este es indicativo de un estado fisiologico normal.

5. No se aconseja la administracion de las substancias estrogenicas cuando el examen citologico revela ya una tara elevada de esta substancia. La razon de esta elevacion aun no se sabe, pero se presentan las opiones de varios autores en este respecto.

6. Se ha expresado el valor del examen citologico en el diagnostico del cancer genital pre-clinico. Toda mujer por lo tanto debe de someterce ha dicho examen periodicamente. La tecnica del vapor yodado no es de valor en el diagnostico del cancer. En cambien el examen citologico por el metodo de Papanicolaou es esencial.

SOMMAIRE

1. Le syndrôme ménauposale combine des symptômes d'origine mentale et physique. Il est essentiel de les différencier entre eux. Le frottis cytologique nous aide à reconnaitre et à différencier les symptômes déterminés par une insuffisance hormonale des symptômes qui sont d'origine psychique. De cette manière, on peut approcher le problème plus intelligemment.

2. Quoique qu'il n'y ait pas de frottis constant ménauposal ou postménauposal, on obtient des renseignements utiles sur l'activité de la région génitale en étudiant les frottis vaginaux et cervicaux.

3. Quel que soit le frottis postménauposal,

l'administration de substances estrogeniques aura certains effets et nous aidera a instituer le traitement approprie

4 Quoiqu'il soit vrai que le soulagement symptomatique soit atteint avant que le frottis optimal soit obtenu, certains travailleurs considerent que le type folliculaire indique un etat plus physiologique et qu'on doit essayer de l'obtenir

5 Il n'est pas necessaire d'administrer de l'estrogene a une femme dont le frottis est normal La raison pour un haut niveau d'estrogene chez les femmes ayant atteint la menaupose est inconnue Plusieures opinions sont presentées

6 Le rôle des frottis cytologiques pour le diagnostique du cancer de l uterus est d'une haute importance Toute femme devrait subir un examen gynecologique periodiquement Pour le diagnostique du cancer, la technique par la vapeur de l'iode est insuffisante L'auteur considere la methode de Papanicolaou essentielle

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Venographic Studies in the Postphlebitic Limb

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THE problems involved in the management of cases exhibiting recurrent ulceration of the leg have been recognized since the earliest days of surgery. With the exception of those instances in which the tissue breakdown is obviously associated with simple varicosities of the superficial venous system, there has been little advance, over the years, in either the understanding of the basic factors in the causation of the ulcer or in the prevention of subsequent ulceration.

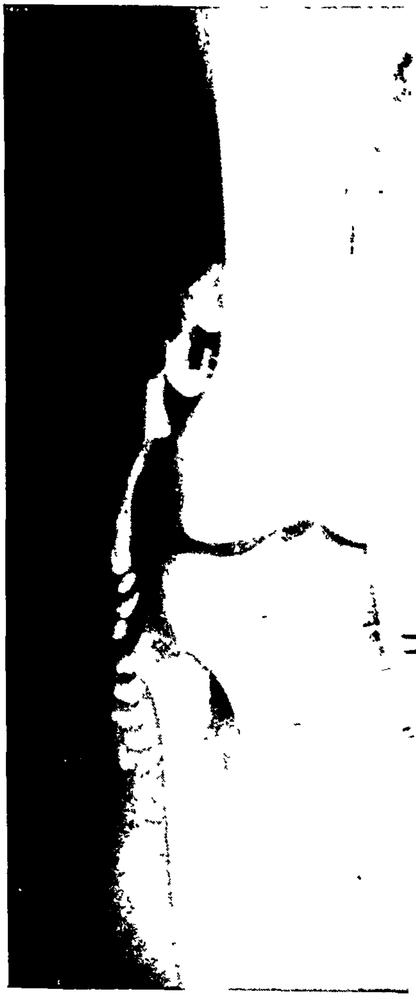

Fig. 1. Injection of a superficial varicosity with patient standing upright, demonstrating retrograde flow.

During the past 20 years studies have been carried out which throw some light upon the abnormal physiological state associated with superficial varicosities. In summary the findings are as follows:

1. *Anatomical Changes:* Superficial varicosities show tortuosity and an increased thickness of all the coats of the veins in some parts and marked thinning of the vein wall in others.

2. *Functional Changes:* (a) Retrograde flow when the subject assumes the erect position (Fig. 1); (b) Incompetency of the valves; (c) Reverse direction of flow through communicating channels from the deep to the superficial venous system.

3. *Pressure Changes:* Studies by Beecher[1] in 1937 indicate that the abnormal pressure relationships found in varicose veins appear only during activity and subsequent work by Mayerson, Long and Giles[2] in 1943 confirm the finding that there is no difference between the height of venous pressure in the normal and varicosed saphenous veins of standing patients.

4. *Changes in Oxygen Content:* Investigations of the oxygen content of the blood in varicosed and normal saphenous veins have been inconclusive. Blalock in 1929[3] concluded that when ulceration is not present the venous oxygen content of the varicosed veins of the lower part of the extremity is lower than that of similarly placed normal veins of the opposite extremity. Holling, Beecher, and Linton[4] in 1938 were unable to demonstrate any difference between the oxygen content of the varicosed vein and its opposite normal. De Takats, *et al,* in 1929[5] concluded that the CO_2 content of blood withdrawn from varicosed veins was increased and the oxygen content decreased. Such blood also had a higher N.P.N. content than that from the normal veins of the leg.

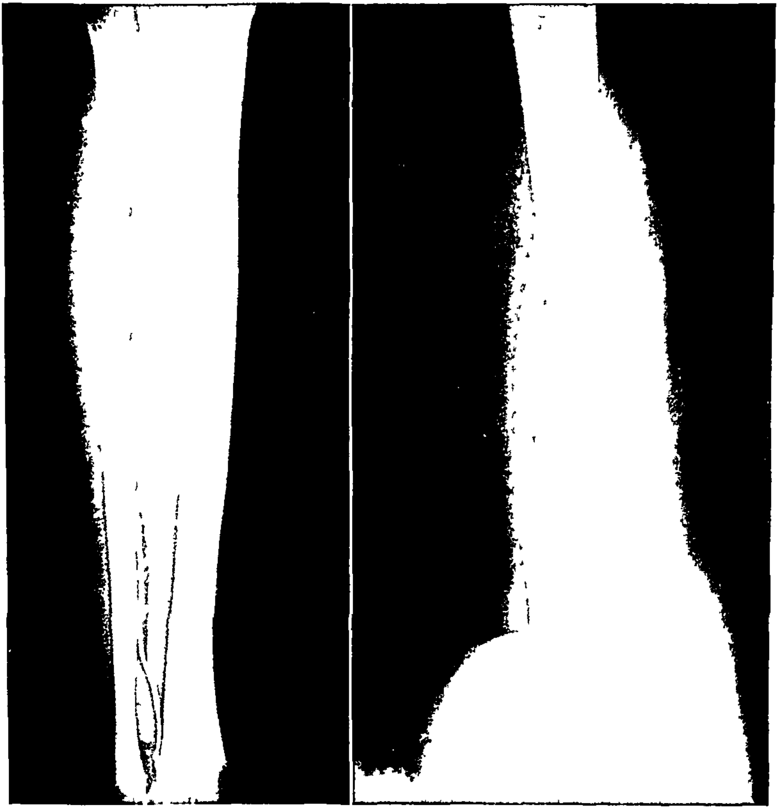

Fig 2A 2B Miss R E P, age 27 Mild varicosities right leg with slight swelling right ankle History and physical examination do not suggest thrombophlebitis Venogram—Normal filling of deep veins in leg and thigh

The most important effect of the varicosity would appear to be the increased venous pressure which presumably results in increased capillary pressure transudation and thus oedema With superadded trauma and infection chronic ulceration may result

The treatment of ulceration of this type is generally satisfactory Prompt healing of the ulcer usually follows the obliteration of the varicosity

Ulceration subsequent upon *thrombophlebitic* involvement of the deep veins is, on the contrary, notoriously difficult to manage Relatively little is known of the altered physiology in this condition Some of the factors involved are (1) obstruction of lymphatics, (2) vaso spasm; (3) alteration of the venous return.

It has been generally assumed in the writings on the subject that, owing to the destruction of the valves in the deep veins (which has been well demonstrated by experiment and pathologically),[6] retrograde flow and pressure changes are to be found in these deep veins just as they are in superficial varicosities.

With a view to confirming or disproving these suspicions, venographic studies have been carried out in this hospital on a series of forty patients, all of whom had histories and clinical findings suggesting that at one time their deep veins had been involved by a thrombophlebitic process. These venograms were carried out by two technics.

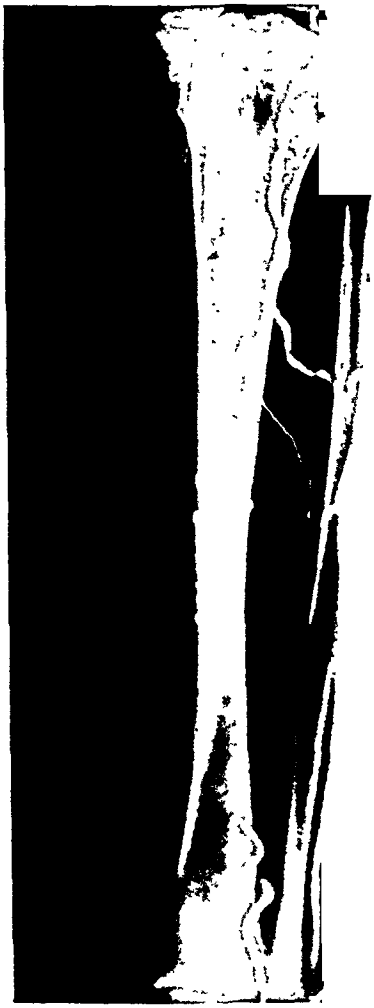

Fig. 3. Mr. R. W., age 51. Varicose veins since 1918. Thrombophlebitis left leg 1947—pain and swelling extending from knee to ankle. Physical findings consistent with deep thrombophlebitis of leg. Venogram shows no filling of deep veins with dilated tortuous superficial veins.

Technic No. 1: Done on all patients.

With the patient lying on the x-ray table, venous tourniquets are applied above the malleoli and in the lower third of the thigh; 20 cc. of 35 percent Diodrast are injected into a vein on the dorsum of the foot. The first film of the leg is taken when half the Diodrast has been injected. The second and third films are taken of the upper part of the leg and of the thigh while the remaining quantity is being injected. A final film is taken of the leg at the completion of the injection, after the tourniquets are removed.

By this technic, the characteristics of the normal venogram are as follows:

The deep veins of the leg can be clearly seen as undulating, branching, well-defined channels converging in the region of the popliteal vein into a single straight, clear-cut channel. The valves can be clearly seen in many instances. There is no flow out of the deep vein system (Fig. 2).

In studying the results in involved limbs it was possible to demonstrate by venogram some abnormality of the venous system in every case in which a definite history of thrombophlebitis had been obtained. Three main patterns have stood out:

(a) Complete obliteration of the deep veins of the leg, occasionally extending up to involve the femoral vein (Fig. 3).

(b) Obliteration of a localized segment in the deep veins of the leg or of the thigh with a collateral venous shunt through the superficial veins detouring the block (Fig. 4).

(c) Generalized dilatation and tortuosity of the deep vein system without block at any point. In numerous films, flow from the deep to the superficial systems was observed and in several cases, incompetent communicating veins were demonstrated at the site of ulceration (Fig. 5).

Although by this technic it was possible to demonstrate an abnormality in the deep vein system of each patient who presented undoubted evidence of old thrombophlebitis, alterations in the direction of blood flow were not demonstrable in spite of efforts involving changes of posture during the radiography.

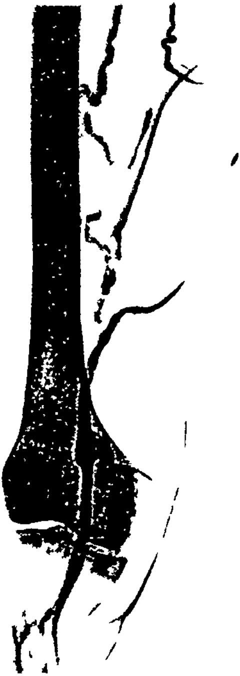

Fig 4 Mr M. B, age 52 Thrombophlebitis right leg 1945 following hemorrhoidectomy and prostatectomy Recurrence of thrombophlebitis in 1947 Persistence of swelling since that time Physical findings—gross edema, cyanosis on dependency, slow blanching on elevation, calf tenderness Venogram—shows filling of the popliteal and deep veins of the leg The femoral vein is blocked at its lower end and a superficial shunt is seen circumventing the block

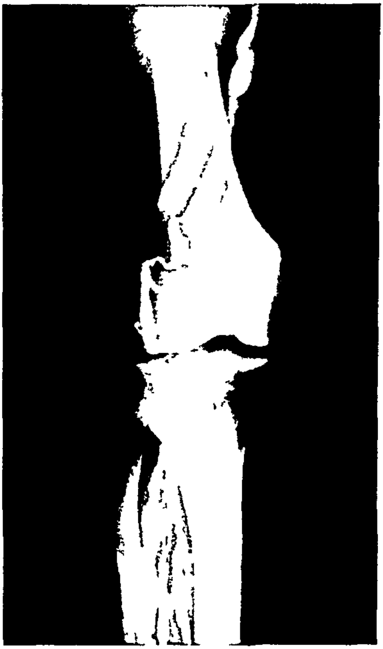

Fig 5 Mr L J A, age 49 Thrombophlebitis right leg following appendectomy in 1917 with persistent swelling ever since No ulceration Venogram shows large, dilated, tortuous deep veins in leg and thigh

Therefore, a second technic was evolved in which the opaque medium could be injected directly into the lower end of the femoral vein at a time when the patient was changing from the horizontal to the upright position

Technic No 2. Done on six patients

The short saphenous vein on the posterior aspect of the upper third of the leg is exposed and a No 8 ureteral catheter is inserted into the vein and passed up a distance of 15 cms sufficient to allow for the entry of the tip of the catheter into the femoral vein The distal end of the lesser saphenous vein is tied off With the patient lying on his back on the x ray table, the table is gradually brought into the upright position Injection of 20 cc of Diodrast into each catheter is commenced when the angle of the table is approximately 45° After the table has reached the vertical position, the injection is completed and at the completion the first film showing the lower third of the thigh and the upper third of the leg is taken Immediately after this, a second picture is taken to show the whole leg and finally a third film is taken to show the thigh

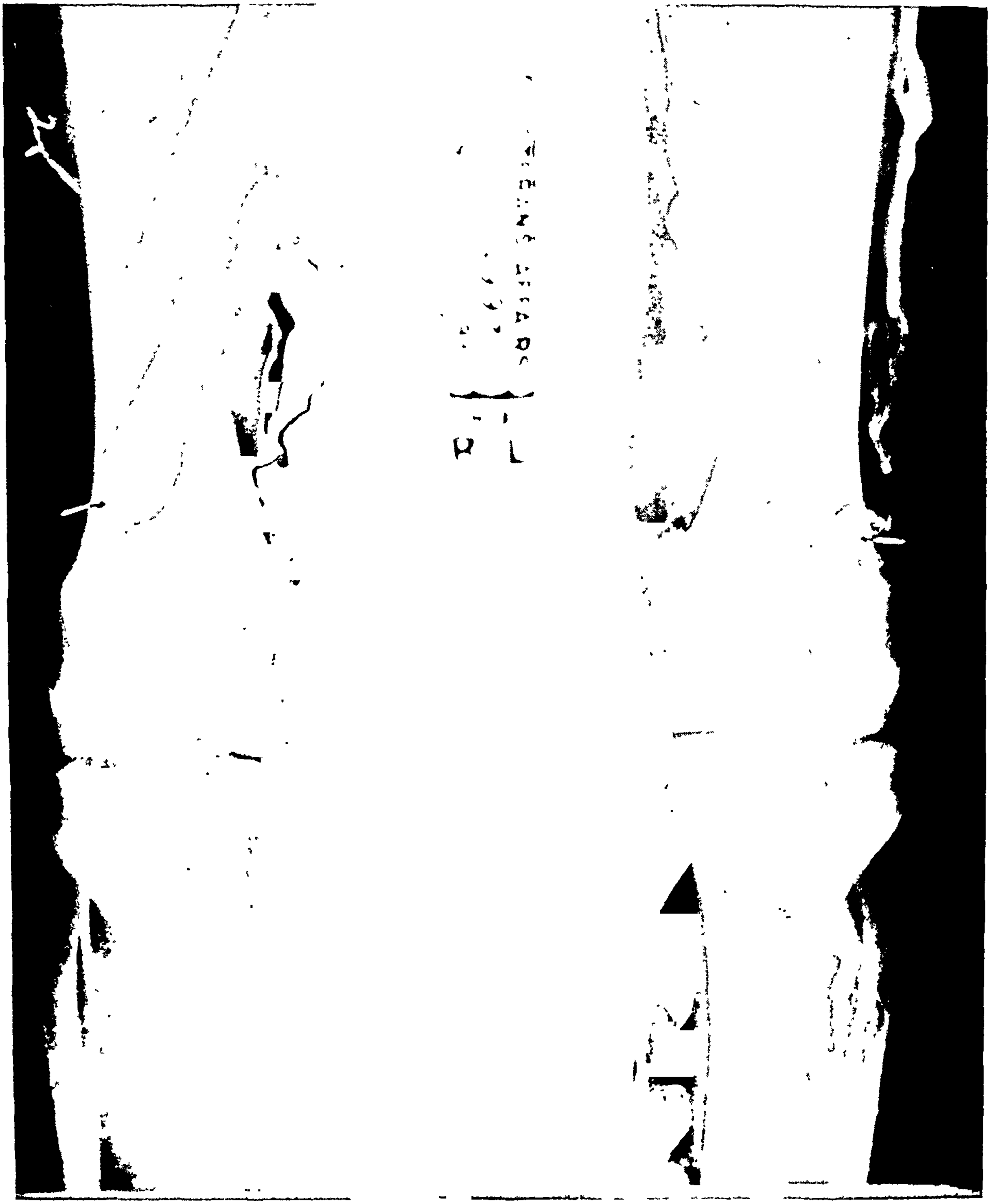

Fig. 6. Mr. F. F., age 67. Thrombophlebitis bilateral in 1901 following enteric fever. Has had recurrent swelling and ulceration of left leg. Examination shows pigmentation, eczema, and edema *both lower legs* with ulceration of left leg. Impression—thrombophlebitis bilateral, more marked on left side. Venogram by catheter technic shows marked tortuosity of both femoral veins and retrograde flow *on* both sides. On the right, flow is to the first valve station distally, but *on the left there is retrograde flow to below mid leg* with gross overflow into the superficial venous system. Markers are at site of tip of the catheter.

By this technic, it has been possible to demonstrate a definite retrograde flow of opaque medium in the deep veins with the patient in the upright position and in addition, flow from the deep vein system to the superficial vein system has been readily shown (Fig 6)

Retrograde flow in femoral veins in normal and abnormal subjects has been previously demonstrated by Luke in 1943 His technic involved the injection of opaque medium into the femoral vein at the groin below a point of obstruction created by compressing the vein against the pubis It is felt that the catheter technic described above, in which there is no more interference with the femoral vein than is caused by the catheter within its lumen, is more likely to give information concerning the actual direction of flow in the vein as the subject's posture changes than does Luke's method

VENOUS PRESSURE STUDIES

In these same patients, with the ureteral catheter tied in to the lesser saphenous vein and passed into the femoral vein, venous pressure studies have been carried out by the following technic

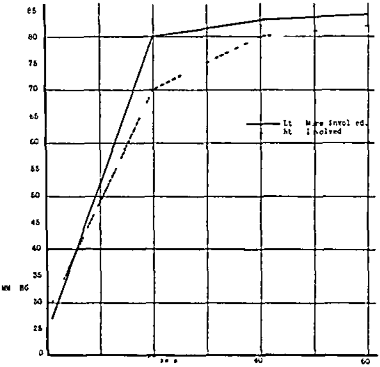

Table 1

Mr F F, age 67 Same case as Fig 6 Bilateral thrombophlebitis—more marked on left side Graph shows a more rapid rise in pressure on the left side on assuming the erect position

Each catheter is connected by means of a length of tubing containing citrate solution to one open end of a mercury manometer Pressure readings were made at intervals immediately after the patient has been elevated

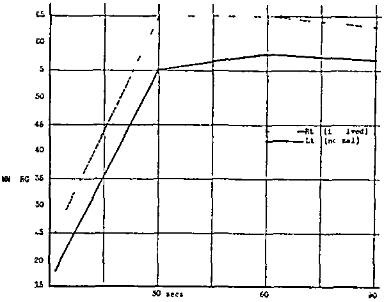

Table 2

Mr [illegible] bilateral, more [illegible] uenza in 1918 Le[illegible] of swelling Recurrence of phlebitis on right side in 1921 following inguinal herniorrhaphy with subsequent ulceration of right shin, which has recurred regularly

Examination—Right leg edema pigmentation, induration, ulceration, cyanosis and bilateral superficial varicose veins Left leg—normal

Venogram Technic No 1—all channels visualized—ragged appearance of right femoral vein

from the horizontal to the vertical position on the x ray table Pressure recordings obtained in two cases are shown in Tables 1 and 2

No conclusions can be drawn from the findings in these two cases It would appear that in a thrombophlebitic limb with retrograde flow, the rise in venous pressure to the maximum takes place more rapidly than in the opposite relatively normal limb The difference, however, was not sufficiently great in these cases to establish this fact Further studies are being carried out

With this technic it is not easy to study the effect of exercise upon the venous pressure which is unfortunate, for, as previously observed, in superficial varicosities significant pressure difference between the normal and the involved side are observed only during activity

These venographic and venous pressure studies indicate that there are various types of abnormalities in the deep and superficial veins of the postphlebitic extremities. It would seem that the rational treatment of any particular case would vary with the type of abnormality present and that to apply a single form of treatment such as femoral vein ligation and superficial stripping, etc. is not reasonable. Inasmuch as physical examination, in itself, yields little differential information, it might be worthwhile to study such cases by methods as described above and to apply treatment as indicated by the findings. For example: if venograms should reveal a block in the superficial femoral vein, it is unlikely that ligation of this vein will benefit the patient. If, on the other hand, venograms reveal that the deep system is dilated, tortuous and shows retrograde flow, then it is probable that femoral vein ligation will result in improvement.

With this in mind, a series of cases is now being undertaken in which the form of treatment will be individualized for each case depending upon the findings of these various studies with the hope that the results of therapy will show some improvement. In this presentation the other factors of importance in the study of the post thrombophlebitic extremity (viz. vasospasm and lymphatic obstruction) have not been considered.

SUMMARY

The abnormal anatomical and functional changes in superficial varicosities are reviewed. It is pointed out that there is little such factual knowledge published regarding the deep vein system in the post thrombophlebitic limb. Venographic studies are presented to demonstrate:

(a) the various types of involvement of the deep veins in the post thrombophlebitic limb, and

(b) retrograde flow of the blood in some of these extremities.

Incomplete venous pressure studies are presented suggesting that there is a slight rate increase of the rise of venous pressure in an involved limb, as compared to its opposite normal, as the subject assumes the erect position A possible practical application of these tests is suggested

RIASSUNTO

Dopo avere passato in rassegna le modificazioni anatomiche e funzionali che ricorrono nelle vene varicose superficiali, l'A. richiama l'attenzione sopra il fatto che scarse sono tuttora le nostre conoscenze sopra la circolazione venosa profonda negli arti colpiti da tromboflebiti. Questa lacuna e' parzialmente colmata dalle ricerche venografiche condotte dall'A., le quali dimostrano vari tipi di modificazioni delle vene profonde, con un frequente flusso retrogrado del sangue. Esami incompleti della pressione venosa sembrano dimostrare un piu' notevole aumento—in confronto con l'arto opposto, normale—col passare dalla stazione orizzontale alla stazione eretta. Questo fenomeno potrebbe trovare un'applicazione pratica.

SUMARIO

El autor hace una revista de los cambios abnormales, tanto anatomicos como funcionales, en las varicosidades superficiales. Tambien llama la atencion a lo poco que se ha publicado con respecto al sistema venoso profundo en las post-tromboflebitis de la extremidad inferior. Se han presentado estudios venograficos para demostrar: (a) los diferentes tipos de afeccion de las venas profundas en las extremidades post-tromboflebiticas, y (b) la circulacion retrograda en ciertas extremidades. Tambien se ha presentado estudios de la presion venosa, y que indican que esta presion aumenta ligeramente mas en las extremidades afectadas, que en las normales, durante el acto de pararce del paciente. Finalmente el autor sugiere la posible aplicacion practica de estas pruebas clinicas.

SOMMAIRE

Les changements anormaux fonctionnels et anatomiques que présentent les varices superficielles sont passées en revue. L'auteur nous dit que nous sommes peu renseignés sur l'état des veines profondes dans les extrémités thrombophlébitiques et sur la circulation sanguine rétrograde dans ces extrémités. Il présente des études vénographiques pour démontrer;

1. Les différentes lésions des veines pro-

fondes dans les l'extrémité post thrombophlébitiques.

2. La circulation sanguine rétrograde dans certaines de ces extrémités.

Une étude de la pression veineuse incomplète est presentée, suggérant qu'il y a une augmentation légère de la pression veineuse dans l'extrémité attaquée comparée à l'autre extrémité, quand le malade prend la position debout. L'auteur suggère l'application pratique que nous pouvons faire de ces études.

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Fascial Necrosis

A New Symptom-Complex Amenable to Surgery Combined with Penicillin Therapy

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THE condition of infective necrosis of fascial septa and aponeurotic sheaths as a cause of persistent soft tissue sinuses, does not appear to have received the attention which it merits. The organism responsible for the fascio-aponeurotic necrosis is most commonly a coagulase-positive hemolytic staphylococcus aureus. Attention was first drawn to this condition in 1945[1] in a report of six cases. McCafferty and Champ Lyons[2] have referred to the occurrence of fascial necrosis following infective streptococcus gangrene. In view of the common symbiosis of the staphylococcus in this condition, it is not unlikely that the latter organism may be causal in their reported cases.

From a review of the cases presented in the protocols it would appear that this condition possesses the following characters:

1. The fascio-aponeurotic zones of the body are mainly affected, viz., thigh, axilla, palm, sole, lumbodorsal region.
2. A subcutaneous collection of seropurulent fluid or pus accumulates over many weeks or months without serious deterioration of the patient's condition. In the majority of cases it is associated with a previous sinus or wound, but in some cases it may arise without apparent cause.
3. This fluid approaches the surface as a soft purplish fluctuant area which is exquisitely tender. There is a wide area of surrounding edema and inflammation. Mild pyrexia may occur at this stage (99°-101.5° F.).
4. The fluctuant area discharges, or is incised, and a quantity of pus or seropurulent fluid is evacuated and a residual sinus continues to drain. In one case, this purplish fluctuant area subsided. It is usually at this stage that the patient first presents for treatment
5. A culture taken from the fluid in most cases reveals a hemolytic staphylococcus aureus which is coagulase-positive. (All cases have been carefully tested for tuberculous infection, with negative results.)
6. The process may repeat itself so that many sinuses may be present. This is more liable to occur if repeated surgery has been undertaken for the eradication of the sinus.
7. In the well established condition, contrast radiography by the instillation of lipiodol reveals a sinus which is remarkable for its length and tortuosity in the thigh and loin (Figs. 1, 2, 3). No bony lesion can be detected on radiographic examination or on probing. The superficial nature and multiplicity of the sinuses in other areas renders contrast radiography impossible.
8. In these cases eradication of the sinus without penicillin therapy (or with systemic penicillin only) has resulted in failure, with recrudescent infection. The use of local penicillin instillation following operation is imperative and a solution of adequate potency must be employed. Our clinical investigations reveal that strengths of 2500 to 5000 units per cc. are necessary to control recrudescence of infection. In other words, the pathogenic staphylococci enjoy a high degree of resistance to penicillin. It is important to irrigate the sinus thoroughly with a penicillin solution of adequate strength for three to four days before operation and after operation until infection has abated. No radical operation should be undertaken in the presence of active infection.
9. If the sinus is laid widely open, it is evident that the subcutaneous layer of fascia or aponeurosis is thickened and necrotic (Fig. 4).

It is frequently covered with granulations which permeate between the fibers of the aponeurotic sheet. The fascia is thick, dead white or mottled, and has lost its natural lustre. This state of affairs extends widely throughout the fascial sheet and appears to involve it throughout the anatomical limits In the thigh and flank the sinus lies deeply against the bone at the attachment of the fascia The lesion is in fact, a fascial sequestrum and the inefficiency of systemic penicillin therapy is explained because penicillin is ineffective in the presence of dead tissue and infection by staphylococci requires a very high local concentration to obviate recurrence

10 Provided that the dead tissue is completely excised, and that the infection is rendered quiescent *before and after operation* by adequate penicillin therapy the condition rapidly improves and cure results If these requirements are not fulfilled recrudescence occurs with the development of fresh sinuses

CASE REPORTS

Case 1 In February 1943 a soldier was seen with several persistent sinuses in the center of the right palm, the skin being thickened and edematous and adherent to the underlying fascia Staphylococcus aureus was cultured from the seropurulent discharge He *had had two previous operations to* lay open the sinuses, but the condition had rapidly recurred Through wide incisions along the palmar creases, and without penicillin, radical removal of the whole palmar fascia was undertaken from the base of the fingers to the transverse carpal ligament Recrudescence of the infection occurred at the wrist and the soldier was boarded out of the Army and returned to his own State with three persisting sinuses

The dead white swollen appearance of the fascia at operation first drew attention to the nature of this condition and the difficulties attending its *management*

Case 2 A young lady, age 20, had been under treatment for a recurrent axillary furunculosis of two years' duration The repeated formation of abscesses which discharged, had failed to respond to radiotherapy by a dermatologist, to autogenous vaccines and to systemic penicillin therapy

I first saw her after she had been in hospital for six months and in both axillae the skin was *puckered, hard and adherent to the underlying* axillary fascia There were many discharging sinuses and from these the culture invariably returned the hemolytic staphylococcus aureus Systemic penicillin therapy (50,000 units third hourly) was commenced two days before operation and continued for eight days after operation The affected skin was excised, together with the entire underlying axillary fascia which was thickened, dead white and necrotic The exposed soft tissues were covered by a rotation flap from the posterior *axillary fold*

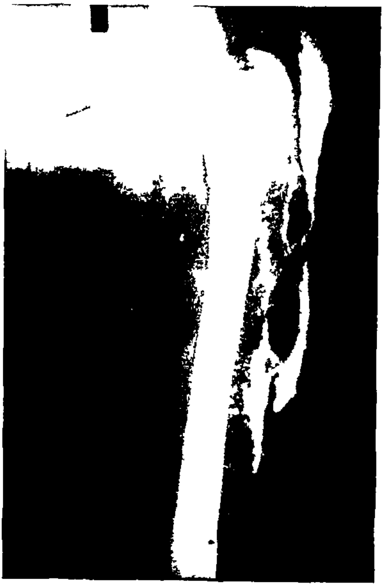

Fig 1 Contrast radiography by lipiodol instillation into sinus of left thigh The external opening is visible and the widely ramifying axial sinuses are revealed close to the femur *(Case 6)*

Skin sutures of No 35 S S Wire were employed throughout, but no local penicillin therapy was used On the third day the suture lines were reddened and multiple small stitch abscesses, growing hemolytic staphylococcus aureus on culture, were evident It was obvious that systemic penicillin therapy had not controlled the recrudescent infection and local therapy was therefore commenced by continuous irrigation through tubes under each flap, employing a penicillin drip containing 5000 units per cc Healing was rapid and occurred in two weeks

Follow up for three years has *revealed no recrudescence*

The course of events in this case indicated to us in 1943 that systemic therapy could not control this staphylococcal infection and thenceforward all cases were managed by combined surgery and local penicillin therapy, in addition to systemic administration.

Case 3: A fallen soldier was sprayed with a Japanese tommygun at close quarters, the bullets perforating the left thigh. Persistent sinuses resulted, for which three unsuccessful operations had been performed. The sinuses presented on the medial aspect of the left thigh and a probe could readily be inserted for a distance of 12 inches through each sinus. Lipiodol instillation showed a long axial sinus lying against the bone on the medial side of the linea aspera and extending from the lesser trochanter to the medial condyle. This sinus communicated with the surface at three sites. Hemolytic staphylococcus aureus was grown from the culture. Local penicillin therapy (2500 units per cc.) was commenced four days before operation and the seropurulent discharge rapidly diminished.

At operation radical eradication of the whole aponeurotic envelope of the middle half of the thigh and the medial intermuscular septum (the walls of Hunter's canal included) was performed. S.S. Wire sutures were employed throughout. The subcutaneous wound, measuring 17 inches by nine inches, healed by first intention except where the irrigating tube sinuses remained for a period of two weeks.

For three years after operation he has remained perfectly well and performs heavy work.

Case 4: A persistent sinus in the right axilla resulted from a grazing bullet wound eight months previously in a 24-year-old soldier. Two previous operations to remove the sinus had been performed.

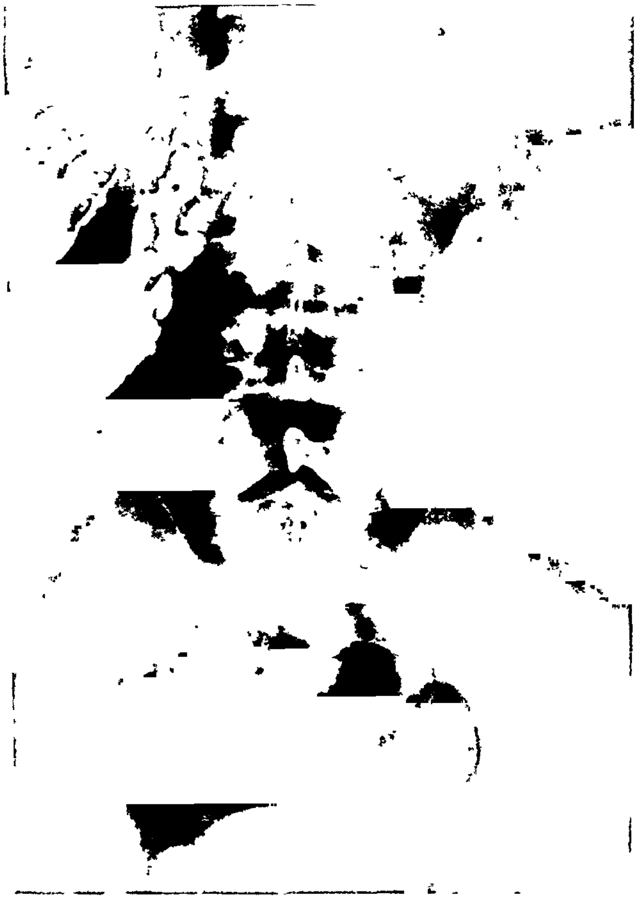

Fig. 2A.

Fig. 2B.

Fig. 2A. Contrast radiography by lipiodol instillation. The external sinus is evident at the left and the complex sinus is revealed extending from the 12th rib to the iliac crest *(Case 8)*.

Fig. 2B. Lateral view, illustrating the situation of the sinus against the lumbar transverse processes *(Case 8)*.

In the depths of this short sinus, necrotic axillary fascia could be seen Owing to the difficulty of irrigating this sinus, penicillin powder was insufflated four times daily for *four days before operation* Hemolytic staphylococcus aureus which was present at the beginning of the preoperative treatment had almost disappeared at the time of operation and the sinus and surrounding skin were widely excised

The amount of axillary skin remaining was inadequate to close the wound A rotation flap was designed from the lateral chest wall to cover the defect, stainless steel wire sutures being employed throughout The wound was irrigated continuously for five days with penicillin solution (5000 units per cc) and healing by first intention was secured Full abduction of the shoulder *being restored in* two months

Case 5 An old axillary scar, following a shrapnel wound in a soldier, age 32 was excised by a colleague and the wound broke down with considerable staphylococcal infection, the axillary fascia being exposed for two square inches The management was *almost identical with that described in Case 4* Healing by first intention occurred

Case 6 A soldier, age 28, had been wounded by a bullet 16 months previously in the lateral upper part of the thigh The funnel shaped sinus was five inches long By lipiodol instillation the deep tracks were shown to extend up and down the thigh on the lateral side of the linea aspera for 10 inches Hemolytic staphylococcus aureus was grown on culture from the sinus Preoperative irrigation with penicillin solution (2500 units per cc) was *undertaken and operation was performed* on the fifth day The entire lateral intermuscular septum of the thigh was removed special care being taken to preserve the lateral femoral artery and nerve Postoperative irrigation was undertaken for nine days and healing was complete in 16 days Follow up for three years has shown a *complete cure*

Case 7 The right antecubital fossa of a soldier, age 34, was a scarred mass as the result of a gunshot wound 10 months previously and three operations were undertaken to cure discharging sinuses The elbow was practically fixed in 50° of flexion Hemolytic staphylococcus aureus was cultured from the sinuses. Preoperative irrigation with penicillin solution (2500 units to the cc) was undertaken for five days before operation *Radical* removal of the entire antecubital fascia, with special care to include the entire lacertus fibrosus, was undertaken The resulting skin defect was covered by rotating a large flap upwards from the volar aspect of the forearm and inserting irrigation tubes at the upper and lower ends of the flap Primary healing was secured in two weeks and a full range of movement was restored in two months

Case 8 Male, age 29, was off work two weeks *in August 1943, with rheumatism in the left flank* He was in the hospital for five weeks before a long perinephric abscess was opened and drained Drainage continued for two months through the incision and then he remained healed for six months In 1944/5 the flank wound has opened and discharged on four occasions all such incidents being accompanied by *fever 102/3° F, the local swelling under the wound being exquisitely tender until discharge* occurred

In April 1945, he was readmitted to the hospital with a discharging sinus He was extensively investigated *for granulomatous infection* (syphilis tuberculosis or actinomycosis) On each occasion hemolytic staphylococcus aureus was grown Urological investigation revealed no renal abnormality but lipiodol instillation showed a long paravertebral sinus extending from the 12th rib to the iliac crest One million units of penicillin were administered *and the sinus explored and excised* although no definite cause was found at operation for its persistence The wound healed and remained closed until November 1945, when he was hospitalized with a recrudescence He was again extensively investigated

The same program was necessary in February *1946, April 1946, and June 1946 When I first saw* him in June 1946 he had two discharging sinuses in the left flank under an old perinephric wound Hemolytic coagulase positive staphylococci were revealed on culture from the discharge

He looked very well and *no constitutional dis*turbance appeared to have resulted from his long history *Lipiodol* instillation showed much the same condition (Figs 2A and 2B) as in April 1945 After one week of preparation the sinus was excised, including the entire middle layer of the lumbodorsal fascia from the 12th rib to the iliac *fossa, where further surgery was prevented by the* presence of the femoral nerve Postoperative instillation of penicillin solution (5000 units to the cc) was continued for nine days and he was discharged from the hospital on the 15th day Two months later he complained of considerable tenderness in the left iliac fossa and feverishness (temp 102 5°) He was admitted *to hospital* and two million units of penicillin were administered *The wound discharged from the* lower end and it was evident that there had been failure to remove the entire area of the affected fascia

In January 1947, the remainder of the fascia was removed, taking great care to dis ct femoral nerve Considerable difficulty was e tered at the arches, from which the pso arose and it was felt that some dead facia had been left in these areas. This was obvious in the postoperative period, for the wound again discharged through the lower sinus on two occasions during the ensuing eight months.

He has remained healed since November 1947. In all, 16 cultures returned a hemolytic staphylococcus aureus. On four occasions a thorough investigation was undertaken for the possibility of tuberculous infection, with negative outcome.

Case 9: A girl, age 19, had slipped and fallen against a step injuring her left hip six months previously. The hip was painful but its movement was not limited, and she was treated by physiotherapy, including shortwave and infra-red, during the ensuing six months. She had not improved and had begun to limp during the previous six weeks. When she was first seen, the left thigh was considerably swollen from the buttock to the lower third behind the iliotibial tract. At this lower point a fluctuant area could be detected which was extremely tender. There was no fever, but a mild neutrophil leucocytosis (12,000 white cells per cm.) persisted. The fluctuant area was aspirated under anesthesia and a considerable quantity of seropurulent fluid was readily withdrawn for culture. This latter proved quite sterile. The needle puncture was enlarged and a drainage tube inserted. Copious drainage of seropurulent fluid continued for three to four weeks.

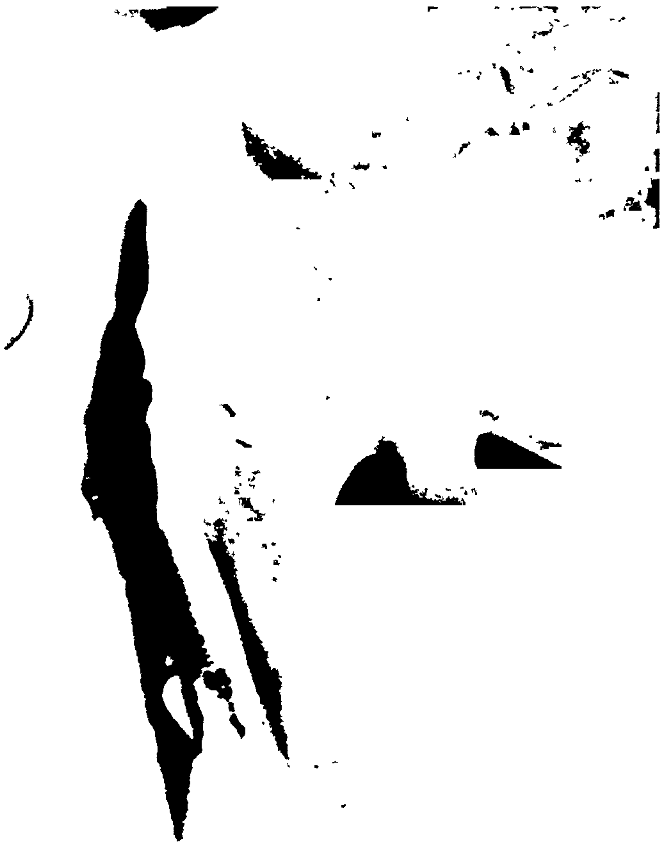

Fig. 3. Contrast radiography by lipiodol instillation. The sinus has been injected from below and reveals its complex character in the thigh and an upward extension to the iliac crest under the iliotibial tract *(Case 9)*.

The following investigations were carried out:

B. Count.......	R.B.C.	4.2×10^6
	W.B.C.	12,000 (86 percent neutrophils).
Blood Urea.....	13 mgms. percent.	
Blood Culture..	Sterile.	
Culture from Discharge	Sterile, including Lowenstein's medium and guinea pig inoculation.	

Biopsy from the sinus revealed an inflammatory infiltration of the wall, with considerable edema, histiocyte response and many neutrophils. No giant-celled systems were seen. Lipiodol instillation (Fig. 3) revealed an extensive sinus in the outer part of the thigh, its extent corresponding to that of the upper two-thirds of the iliotibial tract. She then was seen by Mr. H. R. G. Poate, who concurred in the diagnosis, and an operation was undertaken. The long granulating sinus and the underlying necrotic iliotibial tract was excised widely after one week of preoperative penicillin irrigation. The postoperative course was uneventful, irrigation tubes being removed on the seventh day, and healing was complete in three weeks. There has been no recrudescence.

Case 10: A 36-year-old soldier sustained a transverse bullet wound of the lower trunk in August 1944. The bullet had shattered the right iliac bone, traversed the bladder and emerged through the left upper thigh. He had been under treatment for the urological condition, which resulted from gross urinary tract infection, and had stones removed from one kidney two months before he was seen in 1946. During the previous two years, he had had two attacks of swelling in the upper and inner part of the left thigh below the inguinal ligament. On each occasion the swelling was about the size of an egg, and was associated with the bullet track.

For about three weeks the area would become increasingly tender and the overlying skin at first rosy and then purplish. On the first occasion a small amount of seropurulent discharge was present, which revealed the hemolytic staphylococcus aureus on culture On the second occasion the lesion subsided with penicillin therapy In view of the importance of his urological state, surgery was not advised for the thigh lesion, and his condition has remained quiescent during the last two years

Case 11 Female, age 34, had a high ligation operation performed for the cure of her varicose veins in January 1948 She states that the ligation was combined with the injection of ethamoline and that on the fifth day the wound became red and swollen, and discharged seropurulent material when two sutures were removed Apart from her pain and tenderness she was not particularly ill She left the hospital with a discharging sinus at the medial end of the wound and on five occasions, during the last year, recrudescence of the infection has occurred with purplish induration of the affected area and purulent discharge for a period of two to three weeks On each occasion the discharge has grown hemolytic staphylococcus aureus on culture Lipiodol instillation shows a short stout sinus which passes upwards and inwards to the anterior surface of the fascia lata on the medial side of the femoral vein

Operation was performed and an area of fascia lata, about two and one-half inches in diameter, was eradicated from the medial side of the femoral vein A hematoma subsequently formed in the wound and serous discharge occurred for about two weeks. In the center of the granulating sinus, in this case, was a portion of a silk suture which may have been the original cause of the primary staphylococcal infection

PLAN OF TREATMENT

1 The blood values of the patients were restored when necessary No surgical intervention was undertaken unless the hemoglobin value red blood cell count and hematocrit estimations were normal This demanded blood transfusions in three cases

2 Great care was taken by general and local examination of all the features to ensure that the cause of the condition was local However it was more difficult to assign the condition to the category of fascial necrosis The history of the repeated failure of surgery and chemotherapy to cure the condition, the presence of the sinuses where fascio aponeurotic envelopes are to be expected (axilla, thigh forearm, loin, palm), the absence of a bony lesion on x ray examination, the revelation of a deep racemose sinus on lipiodol investigation, and the recovery of hemolytic staphylococcus aureus from the pus, made possible the predication of the dead fascia as the etiological factor

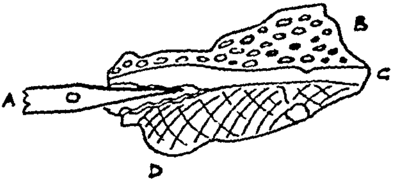

Fig 4 At "A," a pair of scissors is lying in the granulating sinus The zones "B" (edematous fat) and "D" (portion of the vastus lateralis muscle) demarcate the white thickened fascia of the iliotibial tract (c)

3 Preoperative instillation of penicillin solution (2500 5000 Oxford units per cc) was employed for three to seven days until the infection was controlled and the culture material yielded no (or very few) staphylococci

4 In the early cases depot doses of sulphamerazine were employed for 24 hours before and for two days after operation Lately depot and maintenance intramuscular dosage with penicillin has also been employed The uniformity of success with either drug seems to indicate that the local and not the systemic chemotherapy is of the greater importance

5 At operation a wide exposure is necessary, and all sinuses should be made to communicate with the main approach When the skin and fat are undermined the fascia is exposed The fat is often hard and edematous, and primary healing in these cases is difficult to secure unless all such affected fat is excised The dead white or mottled appearance of the fascia is widespread It is thickened and hard to the touch, being in fact a "fascial sequestrum" Its eradication is essential to a good result, and as the condition appears to involve anatomical septa and envelopes, this has been possible in these cases Moreover, the location of indispensable anatomical structures can be predicted and their preservation ensured The resulting cavity is often very large, but its wall is not infrequently composed of muscle bellies, and heals rapidly

6 Tubes are inserted into the cavity for postoperative local penicillin therapy This is required for about seven days in our experience, and it was found advisable to employ

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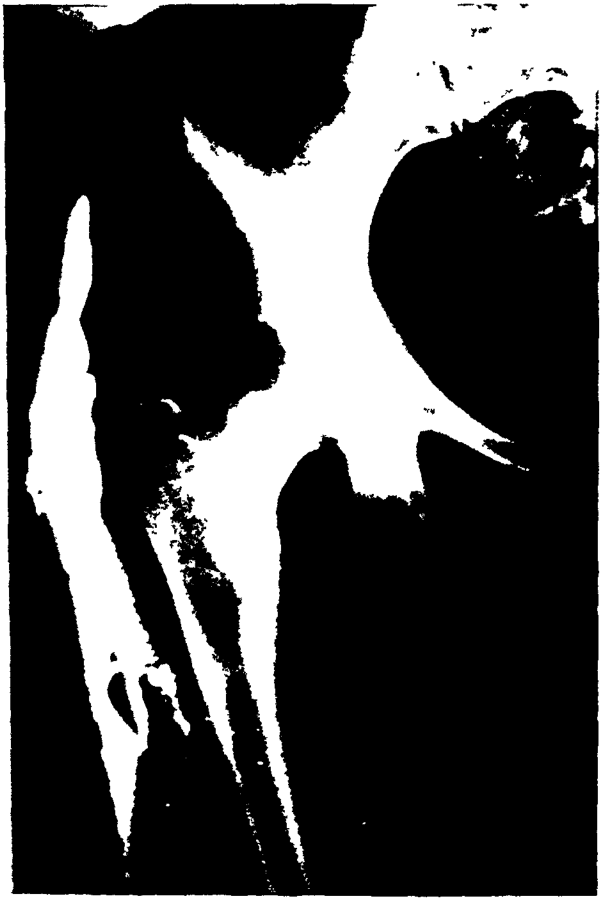

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JOHANNESBURG, SOUTH AFRICA

THE treatment of varicose veins was until recent years regarded with a great deal of complacency The disorder did not menace life and mainly only women were affected The advent of the war however and its demand for man power emphasized the disability engendered in *both* sexes

R Rowden Foote[17] in a painstaking survey of invalidism occasioned by varicosities recorded that 10 percent of all hospital admissions in Great Britain during the years 1942 and 1943 were in this category Complaints of varicose origin were the second largest group dealt with by the Emergency Medical Service

I hope to clarify this problem by describing the measures I have employed at the Varicose Vein Clinic Johannesburg General hospital and in private practice during the past eight and one half years Since the successful therapy of any disorder is necessarily linked to the anatomy of the region affected a review of the venous anatomy, normal and aberrant of the lower limb will be given

VENOUS ANATOMY IN NORMAL AND VARICOSE LIMBS

Before considering these pathways, I should like to pay tribute to certain investigators whose outstanding researches form in my opinion the basis of current attempts at permanent obliteration of varices Though in none of my papers have I dealt exclusively with venous anatomy in all of them is expressed my corroboration of and indebtedness to the work of those who have gone before and paved the way I refer to the epochal studies of Daseler[4] and his associates of Homans and Stalker and Heyerdale[4] on the importance of the groin anatomy in relation to the great saphenous its highest tributaries and the femoral vessels the masterly exposition by Sherman[4] of the relation of the great saphenous to the fascia lata and the perforating veins connecting the saphenous to the femoral, also the revelations of Linton[7] in regard to the numerous channels concatenating the surface veins with the deep in the calf

THE NORMAL LIMB

Venous Drainage from the Above is Mediated by· (1) the deep veins, (2) the surface veins, (3) the communicating or perforating veins

1 *The Deep Veins* These are the anterior and posterior tibial, peroneal popliteal, and femoral veins, from which the blood courses along the external iliac and common iliac veins through the inferior vena cava to the heart Reflux to the femoral vein is obviated mainly by two sets of cup shaped valves in the external iliac vein[3] Similar valves in the femoral itself and firm support of the vessel by the surrounding musculature are adjunct measures

2 *The Surface Veins*. These are (a) the great saphenous, b) the small saphenous, c) isolated perforating and accessory perforating veins

a) The foremost is the great saphenous, which transmits part of its blood through the fossa ovalis to the femoral vein and the remainder along the communicating veins to the deep vessels of the calf and thigh The mechanism in the latter case is one of aspiration[5]—blood flowing along the communicating veins towards the limb center in response to the negative pressure created in the posterior tibial and femoral veins during muscular contraction Of the greatest interest are the investigations of Sherman,[10] who demonstrated conclusively that the saphenous is frequently of a duplicate or triplicate nature, one channel lying deep and the others superficial to the deep fascia the elements fusing in the groin or in the upper third, or even lower third of the thigh This observation will be treated in greater detail

Reflux from above is prevented by the valves in the external iliac vein[3] and from the

the preoperative strength of 2500 units per cc. twice a day in mild infections, and 5000 units per cc. continuously in virulent infections.

7. No buried sutures were inserted unless for the ligation of large vessels. The wound was closed with interrupted stainless steel wire sutures which were left in situ for two weeks. No hesitation was felt in performing skin plastic operations, (especially in the axilla antecubital fossa) to provide primary closure without tension at the suture line.

SUMMARY

Infective necrosis of fascia and aponeurosis due mostly to staphylococcal infection is described with 11 cases reported. The frequency with which the condition is manifested as persistent soft tissue sinuses is emphasized. A plan outlining the essential features of its management by surgery and local and systemic penicillin therapy is discussed.

RIASSUNTO

Descrive 11 casi di infezioni necrotiche delle fascie e delle aponeurosi, per lo piu' da stafilococchi. Richiama l'attenzione sopra la frequenza con la quale queste infezioni si manifestano attraverso seni fistolosi delle parti molli. Delinea un piano curativo che combina la cura chirurgica all'uso locale e generale di penicillina.

SUMARIO

El autor reporta once casos de infecciones necrosantes de las aponeurosices que, segun el, se deben las mas de las veces al stafilococo y se manifiesta muy frecuentemente en la forma de senos persistentes. Tambien discute su plan de tratamiento de estas infecciones por la cirujia y el uso local y sistemico de la penicilina.

SOMMAIRE

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JOHANNESBURG, SOUTH AFRICA

THE treatment of varicose veins was, until recent years, regarded with a great deal of complacency. The disorder did not menace life, and mainly only women were affected. The advent of the war, however, and its demand for man power, emphasized the disability engendered in *both* sexes.

R. Rowden Foote[1] in a painstaking survey of invalidism occasioned by varicosities recorded that 10 percent of all hospital admissions in Great Britain during the years 1942 and 1943 were in this category. Complaints of varicose origin were the second largest group dealt with by the Emergency Medical Service.

I hope to clarify this problem by describing the measures I have employed at the Varicose Vein Clinic, Johannesburg General hospital, and in private practice during the past eight and one half years. Since the successful therapy of any disorder is necessarily linked to the anatomy of the region affected, a review of the venous anatomy, normal and aberrant, of the lower limb will be given.

VENOUS ANATOMY IN NORMAL AND VARICOSE LIMBS

Before considering these pathways, I should like to pay tribute to certain investigators whose outstanding researches form, in my opinion, the basis of current attempts at permanent obliteration of varices. Though in none of my papers have I dealt exclusively with venous anatomy, in all of them is expressed my corroboration of, and indebtedness to the work of those who have gone before and paved the way. I refer to the epochal studies of Daseler[3] and his associates, of Homans[2] and Stalker and Heyerdale[4] on the importance of the groin anatomy in relation to the great saphenous, its highest tributaries and the femoral vessels, the masterly exposition by Sherman[10] of the relation of the great saphenous to the fascia lata and the perforating veins connecting the saphenous to the femoral, also the revelations of Linton[6] in regard to the numerous channels concatenating the surface veins with the deep in the calf.

THE NORMAL LIMB

Venous Drainage from the Above is Mediated by (1) the deep veins, (2) the surface veins, (3) the communicating or perforating veins.

1. *The Deep Veins.* These are the anterior and posterior tibial, peroneal, popliteal, and femoral veins, from which the blood courses along the external iliac and common iliac veins through the inferior vena cava to the heart. Reflux to the femoral vein is obviated mainly by two sets of cup shaped valves in the external iliac vein.[9] Similar valves in the femoral itself and firm support of the vessel by the surrounding musculature are adjunct measures.

2. *The Surface Veins.* These are (a) the great saphenous, b) the small saphenous, c) isolated perforating and accessory perforating veins.

a) The foremost is the great saphenous, which transmits part of its blood through the fossa ovalis to the femoral vein, and the remainder along the communicating veins to the deep vessels of the calf and thigh. The mechanism in the latter case is one of aspiration[3,4]—blood flowing along the communicating veins towards the limb center in response to the negative pressure created in the posterior tibial and femoral veins during muscular contraction. Of the greatest interest are the investigations of Sherman,[11] who demonstrated conclusively that the saphenous is frequently of a duplicate or triplicate nature, one channel lying deep and the others superficial to the deep fascia, the elements fusing in the groin, or in the upper third, or even lower third, of the thigh. This *observation* will be treated in greater detail.

Reflux from above is prevented by the valves in the external iliac vein[9] and from the

length of the femoral by similar valves in the communicating vessels. The integrity of the great saphenous is further safeguarded, though to a lesser extent by the saphenous valve immediately distal to the saphenofemoral opening and by 12 or so valves distributed throughout the length of the vessel. In addition, the healthy construction of the vessel's wall militates against pathological dilatation of its lumen. Both saphenous wall and valves are, however, of lesser moment than the valves in the external iliac and in the communicating veins.

b) Next in importance is the small saphenous, which transmits the bulk of its contents to the popliteal vein, and a smaller volume via the peroneal communicating veins to the peroneal vein itself. The various modes of origin and termination are enumerated later. Reflux is prevented by a valve in the small saphenous, close to the sapheno- popliteal junction and valves in the peroneal communicating veins.

c) Also deserving of mention are isolated perforating veins which occur in the gluteal, posterior thigh, and calf regions. These drain into the inferior gluteal, femoral, or posterior tibial veins respectively, but fail to attract notice until they have undergone varicose transformation.

d) Finally, the accessory perforating veins of Sherman[40] demand attention, for they too become noticeable when varicose. They occur as one or two vessels on the antero-medial aspect of the thigh frequently in relation to a previously obliterated great saphenous. They do not, however, communicate with the latter, but discharge into the perforating veins of the thigh. Reflux is prevented by intra-luminal valves.

3. *The Communicating or Perforating Veins:* These vessels offer an indirect exit to the blood in the great and small saphenous veins, for they bridge the gap between these and the deep veins. Since they normally permit only a one-way flow,[23] i.e. towards the center of the limb, it is patent that their harmonious function is indispensable to the integrity of the surface veins. Once the perforator valves deteriorate, the surface veins become rapidly varicose. In fact, such valvular incompetence is a most important, if not outstanding, cause of recurrence after obliteration of varicosities.

In view of their singular position in the vascular economy of the limb, the communicators are deserving of more detailed elaboration, and I crave your indulgence while referring to their number and situation. Two groups exist, those in the thigh demonstrated by Sherman,[40] and those in the calf revealed by the work of Linton.[26]

The Thigh Communicating Veins: These concatenate the great saphenous to the femoral. They are:

1) The Mid-Hunter canal vein which leaves the femoral opposite the midpoint of Hunter's canal to pass downwards and inwards and join the saphenous deep to the deep fascia.
2) The geniculate plexus perforator, a plexus of veins uniting both saphenous and femoral immediately above the level of the patella.
3) A lesser important vessel, the subsartorial plexus vein, which connects three structures—the two perforators previously mentioned, and the great saphenous.
4) A rare perforator that fuses with both saphenous and femoral in the upper thigh, and may effect recanalization of the former 6 to 8 cm. below the saphenofemoral junction. This vessel has also been encountered by Lyall, and by myself.

The Calf Communicating Veins: The following is an abridgement from Linton:

1) The posterior tibial communicating veins (or medial group): three sets of channels draining into the posterior tibial veins in the upper, middle and lower calf. They communicate also with the great saphenous.
2) The anterior tibial communicating veins (or anterior group): three sets of channels, medial, central or lateral groups, whereof the last is the most important. They unite the anterior tibial to both great and small saphenous veins.
3) The peroneal communicating veins (or lateral group): 5 to 6 in number communicate with the small saphenous.
4) The popliteal communicating vein. Fre-

quently, though not constantly present, it arises from the popliteal vein between the heads of the gastrocnemius and descends with the sural nerve to the middle third of the calf It pierces the deep fascia at this level to join the more superficial small saphenous

When the communicating veins are incompetent, the medial group is at fault in 80 percent of cases, the anterior group in 15 percent and the lateral group in five percent Linton further indicated that the medial group consisted of short, wide, transversely-disposed channels, while Boyd[2] commented on the ease with which sclerosing fluid could enter the vessels following injection into the great saphenous

THE VARICOSE LIMB

The venous pathways of the varicose limb in no way differ from those of the normal member The direction of the stream in the surface veins is, however, altered Gravitational flow down these vessels, especially the great saphenous, is partly or totally unimpeded owing to a congenital valvular deficit followed by relaxation of the saphenous wall as indicated below

(1) The external iliac valves are absent or diminished in number Normally the inferior vena cava and common iliac veins are devoid of valves while the external iliac and femoral veins above the saphenofemoral confluence should contain two sets of semilunar valves Eger and Caspar[9] discovered that in 36 8 percent of dissected cadavers, the expected valves were missing This deficiency was twice as marked on the left side as on the right In their opinion this valvular paucity renders the individual correspondingly liable to the development of varices, since a column of blood from the heart downwards is necessarily supported by the frail saphenous valves guarding the saphenofemoral junction

Friedrich's[13] observation corroborates the foregoing In dissections of 185 cadavers he found that valves were absent in 35 percent of external iliac veins

(2) Valves in the great saphenous of varicose subjects aggregate only one sixth of those normally present This fact was recorded by Hodge[21] and his associates, who slit open and examined great lengths of saphenous veins removed by excision

(3) Valves in the communicating veins, either early or late in adult life, become incompetent, again owing to some congenital developmental aberration The reversal of flow is obvious to anyone who has exposed incompetent communicating vessels at operation Such valvular incompetence may be quixotic in occurrence, involving the great saphenous alone or one of its groin tributaries It may affect only the small saphenous or an isolated perforating vessel to the exclusion of the major subcutaneous veins

(4) Degeneration of the venous wall with consequent relaxation occurs in predisposed subjects with the passing of time, in similar fashion to the development of herniae, haemorrhoids, cataracts, etc Such is the opinion of McPheeters[28] The tendency to degeneration is inherited in 50 percent of cases, though clinical manifestations do not necessarily appear until adult life is reached This mural change, though segmental at first, later becomes diffuse

RECURRENCE OF VARICOSITY

Because of their innate dependence upon the venous anatomy of the limb, the factors predisposing to incomplete cure of varicosity or mediating recurrence will be reviewed here They are

(a) Incomplete obliteration of the great saphenous
(b) Failure to recognize the dual or even multiple nature of the great saphenous and the possibility of its position in the groin being anomalous
(c) Failure to recognize the disposition of the great saphenous in the thigh
(d) Failure to obliterate the duplicate or triplicate channels of the saphenous in the calf
(e) Failure to abolish incompetent communicating channels in the thigh and calf
(f) Failure to detach and obliterate a varicose small saphenous vein
(g) Failure to detach and obliterate varicose isolated perforators

These factors are reviewed below in greater detail

(a) *Incomplete Obliteration of the Great Saphenous:* This connotes the unwitting construction in the groin of a cul-de-sac of saphenous whence recanalization or reestablishment of the vessel is effected following unsuccessful sclerosant therapy, inadequate vein excision, or ligature and division of the vessel distal to the groin tributaries. The cul-de-sac motivates saphenous recurrence in one of three ways: transmitting blood from above, when the vessel has not been surgically interrupted; growing down the path of the excised vessel in response to hydrostatic pressure and the influence of gravity; diverting the blood stream through the groin tributaries which by-pass the site of ligature or vein division, to unite distally with the parent vessel and reopen its lumen.

We have all encountered examples of such varicose reactivation.

(b) *Failure to Recognize the Dual or Even Multiple Nature of the Great Saphenous in the Groin and the Possibility of Its Position Being Anomalous.*

The lowest third of the great saphenous, the lower two thirds, or even the whole vessel, may lie deep to the deep fascia, the remainder of the vein being extrafascial. Further, a large vessel joins the main stem in its upper third or in the groin, while a similar vessel pierces the deep fascia opposite the lower opening of the adductor canal, to join the deep portion of the saphenous. Fuller details are vouchsafed in Sherman's[10] paper. Multiple channels may exist (I have encountered five tortuous yet parallel ones),[14] and fuse close to the saphenofemoral junction. I have on one occasion[14] found the saphenous to enter the lateral aspect of the femoral in the groin after passing from the medial side of the limb across its front to its lateral surface.

Lyall[27] describes an enormous great saphenous which crossed the right fossa ovalis and symphysis pubis to penetrate the left fossa ovalis and end in the left femoral vien. Numerous channels connected it to the right femoral vein. Failure to appreciate these variations in the disposition of the great saphenous is a fruitful cause of recurrence. Homans'[23] percussion test is of service in detecting the arrangement of the saphenous and its multiples.

In exposing the great saphenous in the groin it is prudent to remember that the femoral vessels sometimes lie in an alarmingly superficial position, and are thus prone to injury through blind instrumentation for the arrest of haemorrhage; also that the femoral artery may lie anteriorly to the vein of that name and thus be peculiarly exposed to danger. McPheeters[28] records several cases where both femoral artery and vein, the artery alone, or the profunda femoris artery, were injured in the grasp of a Kocher's forceps. Gangrene of the limb with subsequent amputation, resulted. Though the deep external pudendal artery can be seen pulsating in 90 percent of the cases behind the great saphenous and at the curved lower border of the fossa ovalis, yet the only reliable clue to the saphenous is to discover a vessel which, ascending from below, joins the femoral vein *at right angles,* i.e., *the proximal centimetre of the great saphenous stands vertically in the recumbent patient.* One might ask, is the detection of the saphenous a matter of difficulty? The answer is apparently in the affirmative, for surgeons of note[6] have confessed to *ligaturing and injecting the femoral in place of the saphenous.* How much more likely is the occasional surgeon to err in this way. And deep phlebitis is a most unexpected complication to what purported to be a straightforward operation!

(c) *Failure to Recognize the Disposition of the Great Saphenous in the Thigh:* The multiple nature of the saphenous and the levels where the various channels leave the superficial fascia to course beneath the deep layer have already been indicated. These channels and the perforations they make in the deep fascia are detected by the use of Homans'[23] percussion test, which I employ routinely, and have found invaluable. If sclerosant therapy is used for cure, the deep channel may remain untreated, and predispose to persistence of varicosities below the knee. If operative interruption in the thigh is favored, the search for both channels will exercise one's patience.

(d) *Failure to Obliterate the Duplicate or Triplicate Channels of the Saphenous in the Calf:* These vessels should regularly be put out of action, since there is the possibility of their connection with the deep veins by incompetent perforators.

(e) *Failure to Abolish Incompetent Communicating Channels in Thigh and Calf* The bulk of recurrences are mediated by persistence of incompetent communicators In passing it may be stated that sclerosants are poor agents for obliteration of these vessels

(f) *Failure to Detect and Obliterate a Varicose Small Saphenous Vein* Although the incidence of varicosity in the small saphenous is approximately one in ten, it occasionally reaches tremendous proportions and consequently needs eradication Routine search for this vessel should be made, not only by inspection, but also by palpation, for only by the latter means will the vessel buried in a fat calf be detected For this purpose, the patient should stand *facing* the examiner, the palm of whose hand is passed across the lower half of the popliteal fossa in a to and fro manner, the vein is then discovered as an elastic indentable cord Confusion with the surrounding musculature does not develop

It should be remembered that the small saphenous may terminate in one of several ways[14, 16]—usually in the popliteal vein, less often in the great saphenous, and occasionally by fusion with the lateral or medial superficial femoral veins Rarely, it may ascend the lateral surface of the thigh, pierce the lateral intermuscular septum, and end in the femoral near its middle While the vessel commonly arises behind the lateral malleolus, it may originate from the great saphenous near the medial malleolus, and thus be responsible for recanalization of the distal part of the saphenous and reactivation of a varicose ulcer This sequence of events beset one of my patients[18] in whom I had failed to obliterate a varicose small saphenous

(g) *Failure to Detect and Abolish Varicose Isolated Perforating Veins and Accessory Perforating Veins* These vessels may be of importance, especially the perforator which issues from the calf three inches below the mid point of the popliteal fossa and which is encountered with fair frequency Its presence may induce and perpetuate so called mysterious dermatitis and ulceration in the lower leg Injection of sclerosants into this vessel menaces the patient's life, for the fluid passes directly into the posterior tibial vein, which usually becomes the seat of deep phlebitis

THE TREATMENT OF VARICOSITIES

Treatment is suitably divided into palliative or non operative and curative or operative measures Palliation involves the use of elastic bandages, elastic stockings, and sclerosing therapy, the limitations whereof are known though it should be recognized that stockings are ineffective in warding off thrombosis and ulceration They furthermore predispose to infection with Tinea interdigitalis and to the rapid spread of this disease

SCLEROSANT THERAPY

In connection with this form of treatment, there are disadvantages which are by far insufficiently appreciated, post injection sequelae are common, serious, and even fatal, whilst recurrence of varicosity is almost the rule

(a) *Post Injection Sequelae* These phenomena have been fully ventilated elsewhere,[15, 16, 18] *so that only brief reference to* them will be made here

Local Disturbances Pain and tenderness in the injected vessel, cramps and incapacity are frequently pronounced and may last for six weeks or more Disagreeable wandering, obstinate superficial phlebitis is mentioned by Homans,[23] who also warns against unpleasant inflammatory phenomena where sclerosing solution is employed after the occurrence of deep phlebitis I have known ulceration to extend from the knee to the ankle when sclerosants were used after deep phlebitis Extensive periphlebitis is stressed by McPheeters[28]

Stubborn chemical ulcers may develop Deep phlebitis following sclerosant injections is a depressing and not uncommon complication Major General Ogilvie[37] Consultant to the British Forces in the Middle East, warned that deep phlebitis was so regular a sequel to sclerosant therapy that he doubted whether legitimate grounds existed for the use of such noxious media Boyd,[2] working in a large base hospital in Cairo, saw 12 patients with deep phlebitis following sclerosants between October 1942 and February 1943 Further, in the weekly recategorization boards at this hospi tal, at least one patient per week had to be down-graded for deep phlebitis.

General Disturbances:

(i) A state of thrombophilia is occasionally induced; repeated thromboses occur in vital vessels resulting in the loss of limbs by amputation and even loss of life from pulmonary embolism or mesenteric thrombosis. (Personal communication from Lt. Col. Suzman.)

(ii) Extensive dermatitis is on record.[37]

(iii) Massive and fatal pulmonary embolism is reported by a number of observers (Dean and Dulin,[5] Hanschell,[19] Hejduk,[20] Nunn and Harrison[31]).

(iv) Anaphylactic phenomena with fatal issue have been noted from time to time (Dodd and Oldham,[8] Levi,[25] Meisen,[30] *Oldham,*[33] Ritchie,[38] Shelley[39]).

When massive sclerosing therapy is employed complications of a serious and even fatal nature, are common.

(i) Gangrene of large areas of skin in three patients are known to me.

(ii) Gangrene of the leg followed by amputation is recorded in two cases by Erb.[10] In both, the main artery of the limb underwent vicious spasm, which could not be relieved by any known method.

(iii) Deep phlebitis, with non-fatal pulmonary embolism, is reported by Dodd[7] and has occurred in my practice.

(iv) Deep phlebitis with fatal pulmonary embolism is recorded by various observers. *Hanschell*[19] *had two, Atlas*[1] refers *to two in* the practice of others, Foote[11] refers to several instances, and I[15] have had two in my own patients. Many such incidents of necessity go unrecorded. Vaughn[43] recently referred to 44 fatalities culled from the literature and added one of his own.

(v) Postoperative painless haematuria is mentioned by Dodd.[7]

(b) *Failure to cure varicosities:* The consensus of opinion in regard to the benefit derived from sclerosant therapy is that such benefit is at best of a temporary nature. According to Howard[22] *et alia* and Mahorner and Ochsner,[29] the recurrence rate following injection is between 60 percent and 90 percent. Hanschell[19] claims even a greater recurrence rate. Ogilvie[32] feels that injections have no legitimate place in treatment. According to Homans,[23] "*recurrences are so common and so diffuse as to be difficult to treat by any method.*" McPheeters[28] advises patients to return annually for review and injection. Cooper[3] described 23 types of sclerosing chemicals that have popularly been employed but with unsuccessful results. Simpson-Harvey[41] believes that the crux of sclerosing therapy is the post-injection encasement of the limb in elastoplast.

OPERATIVE TREATMENT

I mention the Trendelenburg operation with disapproval. Hejduk's[20] recurrence rate was 80 percent within a period of five years. Pratt[36] noted 25 percent recurrence in operations performed elsewhere, while Perthes,[35] Miller, and others record 22 percent recurrence. Ogilvie,[32] as a result of his military experience, believes that the procedure has no place in the surgery of varicosities.

The ideal operation should aim at cure of varices, whilst embracing all measures designed to obviate recurrence. It envisages the following desiderata:

(i) Disconnection of the great saphenous from the femoral in the groin.

(ii) Inactivation of communicating veins in the thigh and calf.

(iii) Inactivation of the small saphenous, isolated varicose perforators, and accessory perforators.

(iv) The performance of the operation under *local anesthesia to permit of immediate* postoperative ambulation.

I have named this combined procedure the multiple-resection operation.[16] The principles are reviewed below.

1. *Disconnection of the Great Saphenous from the Femoral in the Groin* (The high-resection operation of Homans).[22] The operation involves:

(i) Disconnection of the saphenous from the femoral to circumvent the negative influence of the valvular deficit in the external iliac vein, and to prevent the establishment of a cul-de-sac.

(ii) Resection of the highest two inches of the saphenous to ensure destruction of all tributaries, since they may initiate recurrence.

2. *Inactivation of Communicator Veins:* This object is achieved by dividing the saphe-

nous from mid-thigh to near ankle into segments one inch to one and one half inches long, and tieing each segment at both ends by 000 silk. The segments in relation to the communicators become T shaped elements, wherein the blood rapidly becomes thrombosed and organized to defeat attempts at saphenous recanalization. For this purpose, small or even tiny incisions are used. One might ask, could not each communicator be demonstrated by phlebography and thereafter excised. Phlebography is not, however, a simple procedure, nor does it reveal every communicator, while serious and even fatal sequelae may occur. Moreover, the technique of surgical exposure of communicators, at any rate in the calf, is beset with great difficulty.

3. *Inactivation of the Small Saphenous.* This vessel is detached from the popliteal vein through an incision placed transversely across the middle of the fossa of that name. It is thereafter divided into short lengths through small overlying incisions.

Varicose perforators and accessory perforators are dealt with in similar fashion.

The operations I have performed in the last eight and one half years for the elimination of varicosities can be grouped thuswise:

(a) 402 high resection operations with massive sclerosing therapy. (Of these the great saphenous was divided 371 times and the great and small saphenous 31 times.)

(b) 398 high resection operations combined with two saphenous divisions in the lower thigh, and three equidistant ones in the calf, also with massive sclerosing therapy, (of these the great saphenous was divided 361 times and the great and small saphenous 37 times).

(c) 600 multiple resection operations, i.e., the high resection operation followed by multiple division of the vein below, but without the use of sclerosants.

In the first group there were two deaths from pulmonary embolism, five cases of deep phlebitis and 10 percent of recurrences. Supplementary injections were required for 45 cases. In the second group the mortality was nil and the recurrence rate was five percent within two years. There were two cases of deep phlebitis. Postoperative pain and invalidism, however, extended to several weeks. In the third group there was one fatality (curiously enough, from paralytic ileus) and one instance of non fatal pulmonary embolism, in a patient who had been subjected to two leg operations within three days. Possibly the excess of coagulant substances liberated into the blood stream from the sites of operation predisposed to this occurrence. Recovery followed bilateral femoral vein ligation. Dual limbs were thereafter subjected to operation at intervals of three to four weeks.

OPERATIVE AND POSTOPERATIVE PROCEDURE OF THE MULTIPLE RESECTION OPERATION

(i) Preoperative sedation is effected by the administration of seconal gr. 3, one and one half hours before operation.

(ii) Both limbs are sterilized from umbilicus to toes, even though only one is subjected to operation.

(iii) In the operating theatre, the patient is made to stand on a footstool, when varicosities distend and become visible. Those buried in fat legs are detected by palpation and the use of Homans' percussion test. The great saphenous is then delineated on the skin surface from mid thigh to near ankle by a suitable dye (I use Bonney's Blue), cross marks being made every inch or one and one half inches along the course of the vessel. The small saphenous and isolated perforators are likewise indicated. *Homans' percussion test*[3] *is invaluable in establishing the exact position of duplicate or multiple channels of the great saphenous, whether they are superficial or deep to the deep fascia.*

(iv) The patient then lies upon the operating table, is draped, and the table arranged in the moderate Trendelenburg position.

(v) The saphenofemoral junction is marked with Bonney's Blue—it lies one and one half inches lateral and slightly distal to the pubic tubercle. From this junction a line is drawn distally and medially to correspond with the position of the subjacent saphenous.

(vi) The groin area is liberally infiltrated with a half percent procaine solution devoid of adrenaline. Although large amounts of the solution (up to 120 cc.) are frequently necessary in fat patients, subsequent healing is perfect if the admixture of adrenaline is omitted.

(vii) Two assistants, four retractors with well curved extremities, and excellent lighting are imperative if the high-resection operation is to be done in comfort and without anxiety. I have found an incision three inches long parallel to the fold of the groin and made one inch below the mark designating the saphenofemoral junction, to be ideal. At this level the vessel is nearer the skin surface than it is in the groin, is therefore more easily discovered, and can be traced proximally with greater safety. The highest two inches of saphenous are excised, together with all related tributaries, and a lateral ligature of 0 silk placed on the femoral. The superficial fascia is closed with 000 silk, and the skin with vertical mattress sutures of fine kaldermic.

(viii) The cross-marks along the course of the saphenous are then infiltrated with one-half percent procaine solution, and small incisions made to expose the vessel. The incisions are in the axis of the limb and vary in length from one inch in the thighs of obese patients to one-eighth inch in the calves of sparsely-built types. Through these incisions the vessel or vessels are brought to the surface by the use of small retractors and the "hooking effect" of artery forceps with curved extremities. The vessels are divided between artery forceps and tied with 00 or 000 silk cut near the knot. Incisions are closed with vertical mattress sutures of fine kaldermic.

(ix) Incisions through chronically inflamed skin are insufflated with sterile sulphonamide crystals prior to closure, while penicillin injections are utilized in such cases pre and postoperatively to ensure wound healing.

(x) The limb is swathed in an antiseptic dressing secured by crepe bandages so as to permit immediate postoperative ambulation, while an elastoplast spica is applied to the groin. The operation lasts from one and one-half to four hours, depending upon the degree of the varicose change and the extent of adiposity.

(xi) For the next 10 days the foot of the bed is elevated eight inches, and the patient when not ambulant (five minutes in each hour) takes meals and foot exercises in bed. Discharge home is effected 24 to 48 hours after operation. Sutures are removed on the 10th postoperative day. The stronger and younger patients may return to sedentary occupations within a day or two of operation if they feel so inclined, but those subjected to prolonged operations find that 10 to 14 days must elapse before work can be undertaken.

RECURRENCE

When 550 patients were reexamined from three months to two years after operation, recurrence was noted in 11 patients. In one, a varicose channel above mid-thigh appeared two years after operation (originating in the uncommon upper perforator described by Sherman[10]); in two patients the great saphenous recurred immediately proximal to the knee; in three, recurrence was observed below knee level. The small saphenous recurred on three occasions, probably owing to the inadvertent construction of a stump. Further, the popliteal fascia which should always be carefully sutured, may have been closed imperfectly. In three patients accessory perforators became varicose and manifest. In two patients diffuse involvement of small unnamed surface veins transpired after saphenous destruction. Such varicosity was moderate in calibre and lent itself to eradication by small amounts (½ cc.) of Ethamolin (sclerosant). It is remarkable that the above recurrences followed operation on early varicosities. No recurrence was apparent after advanced varices had been obliterated. It is also noteworthy that in the vast majority of patients, scars could be discerned only with great difficulty after the lapse of one year.

CONCLUSION

In conclusion may I say that the operation is well tolerated, even by the elderly (people over the age of 70). Limbs both fat and thin, patients with ulceration and dermatitis, past subjects of coronary thrombosis, all have derived supreme benefit.

No reference has been made to the treatment of varicose ulceration, for such reference would have unduly prolonged this address. This matter has been dealt with in a communication recently published.[15] It can be stated that the multiple-resection operation for the cure of varicose veins and ulcers has proved in my hands the most reliable and the safest in practice while the least incommoding to the patient.

SUMMARY

Newer concepts in the anatomy and treatment of varicose veins are reviewed Such concepts based on extensive anatomic research establish the primacy of valvular defects in the development or recurrence of varicosities The valves *concerned are those of the external* iliac veins and those of the communicating veins of the thigh and calf The importance of these observations is corroborated by information gained by the author from 1400 operations upon limbs with varicosities The multiple resection operation performed under local anesthesia has given him the greatest percentage of cures, and has been the safest for the patient

RIASSUNTO

Passa in rassegna i concetti piu' moderni sopra l'anatomia e la terapia delle vene varicose Traendo argomento dalle informazioni attinte da 1400 operazioni, l'A ritiene che la causa dell'insorgenza e della ricorrenza delle vene varicose delle gambe consista in un difetto primitivo delle valvole delle vene iliache esterne e delle vene comunicanti della coscia e del polpaccio I risultati piu' favorevoli sono stati *ottenuti con la resezione multipla* delle vene, in anestesia locale

SUMARIO

El autor sumariza la anatomia y el tratamiento de las venas varicosas Estos conceptos anatomicos establecen la importancia de los defectos valvulares como causa primaria en el desarrollo de estas varicosidades y en su recurrencia *Estos defectos* se encuentran en las valvulas de las venas iliacas externas y en las venas comunicantes de la region femoral y posterior de la pierna Esta conclusion del autor se basa en su experiencia *de mas de 1400 operaciones El metodo ope*ratorio de reseccion multiple bajo anestesia local, segun el autor, da mayor numero de curaciones y es de menos peligro para el paciente

SOMMAIRE

Des nouvelles conceptions sur l'anatomie et le traitement des varices aux jambes sont resumées dans la conference Ces conceptions sont basées sur une étude anatomique trè étendue qui établissent la primaute des défaut valvulaires dans le développement et la recurrence des varices Les valvules en questio sont celles des veines iliaques externes et celle des veines communicantes de la cuisse et du mollet

L'importance de ces observations est corroborée par l'information gagnée par l'auteu après avoir opéré 1400 malades atteints de varices aux jambes L'opération de resection multiple faite sous anaesthesie locale a donn a l'auteur le plus grand pourcentage de guérisons avec le maximum de securité pour le malade

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Fractures of the Tibial Spine with a Case of Overgrowth of the Ununited Fragment

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THE tibial spine is an intercondylar bony eminence giving attachment to the anterior cruciate ligament A detailed anatomical description of 16 dissected cadaver knee joints is described by Anderson[1] According to Mercer[2] the spine consists of two tubercles separated by an antero posterior groove The lateral tubercle is slightly smaller and some fibres from the anterior extremity of the lateral semilunar cartilage are inserted into it The larger medial tubercle receives some fibres from the anterior cruciate ligament

Roth[3] states that Poncet first described a fracture of the tibial spine in 1875 as a postmortem finding in an individual who died instantly in a fall from a third story window Pringle[4] in 1907 first described its occurrence in a living subject

Fractures of the intercondyloid eminence are often seen combined with fractures of the tibial condyles As an independent lesion the whole eminence is most frequently broken off and the front lifted up Olaussen[5] says often there is found at the same time a fracture in the anterior intercondyloid fossa Watson Jones[6] regards a fracture of the tibial spine as an avulsion of the anterior cruciate ligament together with a fragment of bone from its tibial attachment The mechanism producing internal derangement of the knee relative to this structure is usually the same as that causing a tear of the medial semilunar cartilage

This fracture occurs almost invariably between the ages of 10 to 20 years and is regarded by Watson Jones as the injury of adolescents which corresponds to rupture of the anterior cruciate ligament in adults, and the most frequent injury is a blow to the front of the flexed knee joint which drives the femur backwards on the fixed tibia According to Olaussen fractures of the tibial spine are very often due to falls when skiing The fragment is displaced forward and upward, the displacement causing limitation of the terminal 10° or 15° of extension

Koch found this type of fracture was in nearly two thirds of the cases due to a bicycle fall and he explains the mechanism as follows while falling, the patient stretches out his leg, the foot strikes the ground with flexed knee whereby a rotation movement in the knee joint is produced

Fracture of the tibial spine does not occur frequently In 5840 consecutive recent fractures, Clarke[8] observed 12 cases in 32 tibial fractures involving the knee joint In the Massachusetts General hospital, Barr[9] found four cases among a total of 4390 fractures In a series of 59 intra articular fractures over a 10 year period from Jan 1, 1931 to Jan 1, 1941, Koch found six cases of isolated fracture of the intercondyloid eminence occurred

The diagnosis is made by a history of rapid swelling of the knee joint following injury, clinical signs of haemarthrosis, the knee held in partial flexion and x ray evidence Active and passive motions of the joint as well as weight bearing are painful The most characteristic sign is a firm bony block to full extension In a torn semilunar cartilage the block to extension is cartilaginous in type Often an avulsion of the tibial spine is accompanied by a tear of the tibial collateral ligament

Smillie[10] states that like rupture of the anterior cruciate ligament it is an injury which is frequently missed, having been diagnosed as synovitis *Adult patients are repeatedly encountered* with symptoms of an internal derangement relative to a recently torn meniscus who demonstrate the abnormal anteroposterior mobility associated with a ruptured or stretched anterior cruciate ligament but who on x ray examination demonstrate an old unreduced fracture of the tibial spine

Treatment of fractures of the tibial spine is not definitely agreed upon The most important factor in treatment is building up the quadriceps extensor muscles Bancroft and

Fig. 1A

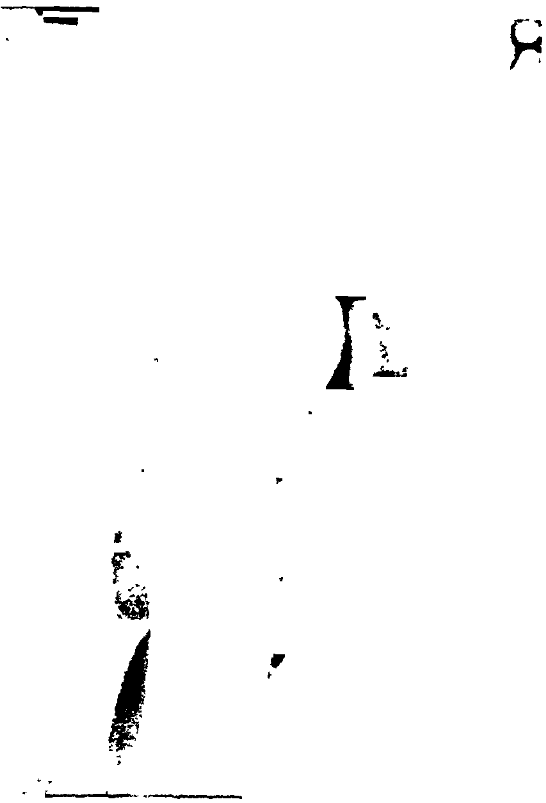

Fig. 1B

Murray[11] state that conservative treatment should be tried for a period of time rather than immediate operation. Reduction and fixation present great difficulties. The possibilities of manipulation are limited. It may be possible to reduce the displacement by manipulating the joint under anaesthesia, but if x-rays do not show accurate reduction, operation is advisable. Gross displacement with instability of the joint is the indication for operation.

In old standing cases of fracture of the tibial spine the fragment can no longer be replaced by manipulation. Bohler[12] states that after six weeks the fragment is thickened and deformed and the hollow from which it is broken is filled with callus.

In the following case the fragment of bone which resulted from a fracture of the anterior part of the tibial spine had overgrown considerably as shown by x-rays originally taken June 6, 1940, and later films taken eight years later on Feb. 20, 1948:

CASE HISTORY

Housewife, age 41, Dec. 23, 1939, fell backwards in her home. Her husband tried to break her fall and grabbed her right leg, holding it as she fell. She felt a "crack" in the right knee which swelled soon afterwards. She saw a chiropractor two days later and altogether visited him on three occasions. I saw her the beginning of June 1940 at which time she complained of the knee being painful and swollen after being on it for some time, and inability to straighten her right knee fully.

X-rays were taken on June 6, 1940 (Fig. 1). An operation to remove the fragment was advised but this was not done. She was not seen again until Feb. 18, 1948, when she complained of the knee being painful when she was up and about for a little while and of being unable to straighten the leg fully. She was fond of dancing and was unable to do so since her injury in December 1939.

Examination showed wasting of the vastus internus muscle, no swelling, tenderness over the joint line immediately medial to the patella, and full extension limited by 20°. X-rays were again taken on Feb. 20, 1948 (Fig. 2).

Fig. 2A

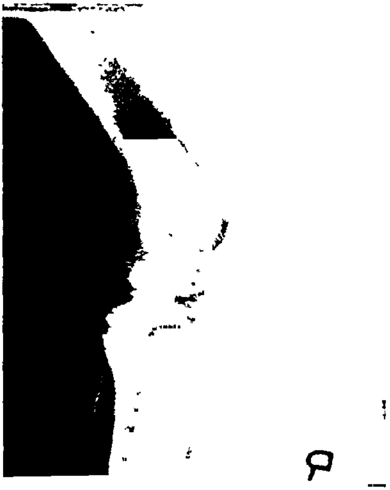

Fig. 2B

An overgrowth is seen of the fragment of bone illustrated in the previous examination on June 6, 1940. It now measures 2 cm. in an anteroposterior diameter and 2.7 cm. in width. No definite union was shown between it and the tibia. Quite a large bony spike extends upwards from the anterior part of the tibia. This was not present previously. Early calcification in each meniscus is probable.

An operation was advised, and on March 2, 1948, this was performed on the right knee at the Grace hospital, Winnipeg. Under spinal anesthesia and tourniquet a median parapatellar incision was made, and the joint exposed. As stated by Bohler "the piece of bone so clear in the x-ray cannot be seen." After displacing the patella laterally and palpating the head of the tibia the fragment was felt embedded under the anterior attachment of the anterior cruciate ligament, and the spur at the tibial margin was palpated.

The spur was removed with an osteotome level with the rest of the anterior margin of the tibia and the fragment dissected out by sharp dissection from its connective tissue bed. The frayed anterior end of the anterior cruciate ligament was trimmed off but not sutured back. The synovial membrane was congested. A small degenerated area of articular cartilage on the medial surface of the lateral femoral condyle was smoothed off.

The wound was closed in layers and a posterior plaster slab applied. She was given penicillin parentally postoperatively for four days, and ran a postoperative temperature up to 102° F. in the evenings. A chest plate on March 10 showed evidence of subacute inflammation in the right chest, especially the lower lobe. Routine laboratory tests, except a sedimentation rate, were negative.

Quadriceps exercises were started on the fourth postoperative day and hamstring exercises about the 14th day following the removal of sutures. She was discharged on March 18 with the highest daily temperature of 99.4° F. The patient kept a record of her temperature twice daily at home and within 10 days it returned to normal.

Pathological Report: Loose body from the right knee. Gross irregular piece of cartilage and bone measuring 25 by 10 cm.

The patient has been seen at regular intervals since her operation, and was last examined on Jan. 19, 1949. She had no complaints relative to her knee and was able to walk any distance. She now enjoys her dancing, and is able to walk downstairs without any difficulty or weakness of the knee. Extension of the knee is 180° and [illegible] [illegible] [illegible]ps is very good. The knee is stable. X-rays were taken of the right knee on Jan. 19 in full extension. Outside of some calcification in the menisci shown in the preoperative x-rays, the knee is radiologically negative.

Comment: This case demonstrates the subsequent progress of an ununited fracture of the tibial spine over a period of eight years. An overgrowth of the ununited fragment occurred, associated with quite a large bony spike from the anterior margin of the tibia, both of which formed a definite bony block limiting extension to 160°. Growth of bone can only occur in the presence of a lavish blood supply which the fragment must have secured from its soft tissue attachments from which it was removed by sharp dissection. Growth of cartilage does not require a blood supply as its nutrition is received from the synovial fluid. This would explain the course of events in this case.

The bony spike originating from the anterior margin of the tibia coming up to meet the ununited fragment is likely an osteoarthritic change, traumatic in origin. A review of the available literature does not reveal any other case of overgrowth of an ununited fracture of the tibial spine.

SUMMARY

1. Fractures of the tibial spine are reviewed.
2. A case is reported of an ununited fracture of the tibial spine with overgrowth of the ununited fragment associated with a spur from the anterior margin of the proximal end of the tibia over a period of eight years.
3. A satisfactory anatomical and functional result was obtained by removal of the ununited overgrown fragment and tibial spur by operation.

RIASSUNTO

1. Passa in rassegna l'argomento delle fratture della spina della tibia.
2. Descrive un caso di frattura della spina datante da otto anni, nel quale il frammento staccato era cresciuto in eccesso, con la formazione di uno sperone a livello del margine anteriore dello estremo prossimale della tibia.
3. Una perfetta guarigione clinica ed anatomica e' stata ottenuta mediante l'asportazione del frammento staccato e dello sperone tibiale.

SUMARIO

1. Se hace una revista de las fracturas de la espina de la tibia.
2. Se reporta un caso de fractura de la espina de la tibia con falta de consolidacion de los fragmentos de mas de ocho anos de duracion.
3. Se han obtenido en este caso resultados anatomicos y funcionales satisfactorios por medio de la intervencion quirurjica cuya tecnica ha sido descrita en este articulo.

SOMMAIRE

1. Les fractures de l'épine tibiale sont passées en revue.
2. L'auteur rapporte un cas de fracture non unie de l'épine tibiae compliquée à hypertrophie du fragment non-usi associé à l'éperon. Le siège de la fracture était au bord supérieur de l'extrémité proximale du tibia.

Cette fracture avait duré huit ans:

3. On obtint un résultat anatomique et fonctionnel satisfaisant par l'enlèvement du fragment détaché hypertrophié et de l'épron du tibia.

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Fluid Balance in Surgery

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NORMAL

SEVENTY percent of the body weight is water in three compartments, first intravascular where about three and one half litres is circulating, second interstitial containing about 10 litres and third intracellular where 35 litres is to be found in normal circumstances in an adult. The contents of these three compartments are in a constant state of flux: the water in them carries nutritive elements from the vessels to the cells and it carries waste products in the reverse direction.

In one day the kidneys must excrete about 35 grams of waste products. This amount can be washed out in 500 ml. urine if the specific gravity is 1030. 1500 ml. urine is required to excrete 35 grams of waste at a specific gravity of 1010. It is important to remember that the immature kidney concentrates poorly. Hence children may need two or three times as much water as adults (in proportion to their weight) to enable them to excrete their waste.

The body loses water through the kidneys about one and one half litres per day; an equal amount is lost through the lungs, skin and feces. Fluid balance is normally maintained by compensating this loss by a fluid intake of three litres daily. About one litre is in the food and two litres in the fluid ingested.

Within the body three large circulations of fluid are in constant motion:

1. *Cerebral*: About 20 ml. of cerebrospinal fluid are secreted every hour and reabsorbed, i.e. half a litre or so per day.

2. *Renal*: The glomeruli of the kidneys filter through about 170 litres (37 gallons or 15 bucketfuls) in 24 hours; of this enormous flood the tubules resorb 168.5 litres and 1.5 litres is left to collect in the bladder.

3. *Intestinal*: In the intestinal tract two or three times the volume of fluid drunk is excreted and absorbed every day. This secretion amounts to more than twice the whole volume of the blood plasma.

The secretions of the parts of the intestinal tract are approximately:

Salivary Glands	1500 ml. daily
Stomach	2500 ml. daily
Bile	500 ml. daily
Pancreas	700 ml. daily
Intestinal Mucosa	3000 ml. daily
Total =	8200 ml. daily (or 2 gallons)

DISTURBANCES

The fluid balance briefly described above may be upset by shortages or by losses at many points.

Hemorrhage. An important conclusion from Whipple's experimental work on blood loss is that depletion of cells is less damaging than depletion of plasma. The fluid loss is more important than the solid.[3]

Burns. In severe injuries of this type one quarter of the blood plasma may exude from the burned surfaces in 20 minutes; one half may be lost in two hours.

Vomiting. A dry tongue indicates that about six percent of the body fluid has been lost. The stomach keeps on secreting HCl, even though the body is becoming more and more alkaline.

Inability to ingest. In obstructions to esophagus, stomach or intestine inevitable losses of fluid continue while replacement per vias naturales is impossible.

Aspiration. Consideration of the amount of fluid in circulation in the intestinal tract indicates how much may be removed by Wangensteen suction from the different levels.

Fistulas. Intestinal, biliary, pancreatic may lead to severe fluid losses.

Ileus. Enormous quantities of fluid may be poured into distended intestinal loops. From these there is little or no resorption, so that the fluid is really lost to the body.

Peritonitis, Pleurisy. Similar losses of fluid occur into serous cavities.

Diarrhea. Calamitous losses may occur. Below the level of the pylorus the intestinal secretions are alkaline, therefore their excessive loss will cause acidosis. Above the pylorus excessive loss of acid gastric secretion will produce alkalosis.

Trauma: Permeability of the capillaries is increased to such an extent that the blood volume falls because fluid is lost to the tissues. This is the clinical condition of "shock."

RESTORATION

The best way to restore fluid balance is by drinking. Only pure water will restore the balance when deprivation of water only has occurred. This is an unusual happening in temperate climates, and therefore it is almost certain that replacements of more than pure water will be necessary. Besides water, the following substances are likely to be required to restore fluid balance adequately: proteins, fats, carbohydrates, salts and vitamins. These essential foodstuffs can be supplied in sufficient amounts for the body's needs by the mouth only.

It is important to be able to tell when enough fluid has been absorbed. This is measured by the urinary output. Every eight hours 500 ml. should be excreted. This urine should contain between three and five grams of NaCl. per litre. A simple test[1] to estimate the NaCl. content of the urine by the bedside has been described by Fantus. To 10 drops of urine is added one drop of potassium chromate 20 percent to act as an indicator, 2.9 percent AgNo3. solution is then added drop by drop. The number of drops required to turn the yellow indicator red represents the number of grams of NaCl. in one litre of urine tested.

In addition to what is given by the mouth it may be necessary to give blood or plasma or oxygen. In acute hemorrhage, massive transfusions of whole blood given quickly may be essential. In chronic anemic states drip transfusions of whole blood, given slowly, will be needed. In hypoproteinemia, plasma will be required to maintain nutrition and the osmotic pressure of the blood plasma. In anoxia oxygen by inhalation may be life saving.

Unconsciousness may prevent the patient drinking the necessary fluids. It is much better in such cases to use intragastric or duodenal feeding with a Levin tube than to resort to intravenous therapy. By intubation it is easy to inject 3,000 calories in food and to maintain fluid balance and nitrogenous equilibrium. Difficulties in the way of restoring and maintaining fluid balance are much increased when neither swallowing nor intubation of the intestines is possible. Subcutaneous infusion is unsatisfactory and unreliable. Proctoclysis is completely insufficient for anything except water and a few drugs.

We are forced then to resort to the intravenous route. At best this is much inferior to the normal intestinal route because: (1) it is impracticable to inject intravenously enough protein, fat and carbohydrates for daily needs; (2) it is difficult to control the speed of injection of fluid and foodstuffs; and (3) it is dangerous because of the risks of overloading lungs, heart or tissues.

Safety in intravenous therapy depends on three considerations: (a) content of the injection; (b) amount; and (c) speed at which it is given.

Speed: It has been said that the vascular system can accustom itself to accept 1 cc. of intravenous fluid per lb. of body weight per hour.[2] This amounts to 40 drops per minute for the average adult—less than one drop per second. In practice this is too slow to allow the patient any rest from his infusions. Therefore the rate may be increased to 60 or 80 drops per minute while the bases of the lungs and the loins are watched for any sign of edema. Long continued intravenous drips can be made more comfortable by having the needle in a vein of the hand or forearm so that movement of the arm is possible. An arm splinted in extension for hours while a needle is kept in an antecubital vein can be an intolerable nuisance. The only exception to the slow speed recommended is in the case of hemorrhage.

Then a healthy adult who has sustained a sudden severe loss of blood should have his blood volume restored with whole blood at the earliest possible moment. He may for instance, receive a pint of blood in 20 minutes; in extreme cases two pints may be injected in this time.

Under such circumstances it is well to remember that the arms are better than the legs and that cannulae are better than needles.

The leg veins may be in such spasm that transfusion of blood into them may be impossible even with strong positive pressure. The arm veins or those in the neck can always be transfused quickly however "shocked" the patient may be. Cannulae are better than needles, again because of venous spasm. It may be very difficult to enter collapsed contracted veins with a needle, it is safest and surest to expose the vein and insert a cannula. The best cannula is one with the expanded part of its nozzle about one fourth inch behind its tip. This is to permit entering a contracted vein.

Amount It is usually impossible to calculate accurately how much fluid is lost by vomiting, aspiration, drainage from fistulae or diarrhea. A rough guess only can be made. In these circumstances the best guide to the amount of fluid to be given is the urinary output. One half litre every eight hours is the amount to aim at, but if the kidney concentrating power is excellent one third of this amount may be enough. One litre per 24 hours will suffice in the ordinary case.

Content (a) *Protein*—a hypotonic fluid injected intravenously will damage not only blood cells but will give rise to generalized edema. If persisted with, such an infusion will cause convulsions such as occur in water intoxication. An isotonic salt solution is little better it also will cause waterlogging of tissues when given into a vein. The essential constituent of fluids for intravenous therapy is protein. Starling was the first to show that the blood volume was maintained by the osmotic pressure of its proteins. Without this constituent, it has been calculated that all the plasma would escape from the vessels in 10 seconds.

In intravenous therapy it is a common error to give too much salt too much water and too little protein. Hypoproteinaemia is therefore our chief concern in arranging the contents of infusions. It is the albumin fraction of the protein that matters most and is responsible for 80 percent of the osmotic pressure exerted by the proteins in the blood.

Protein lack occurs in malnutrition large areas of suppuration, intestinal obstruction bleeding, burns and trauma. Such deficiency of protein manifests itself clinically as shock hemoconcentration suppression of urine and abdominal distention. These last two signs follow the interference with the kidney and the intestinal wall caused by edema.

Correction of protein lack by intravenous infusion demands two different methods one for emergencies the other for occasions when the body can have time to assimilate and utilize amino acids.

Emergency Replacement: In hemorrhage whole blood will most rapidly and safely restore the normal balance. In burns and scalds plasma will be more suitable to combat hemoconcentration. During operations where blood loss is expected to be severe the blood transfusion should be dripping before bleeding can impair the patient's condition. It is easier to prevent shock by maintaining the blood volume than it is to treat shock well established. Two bottles of blood will be needed for any severe operation but four or more may sometimes be required.

Deliberate Replacements: The constituents of protein can be injected into the blood stream in the form of polypeptides and amino acids. Amigen is a commercial preparation of proteins split up by hydrolysis by enzymes and contains the equivalent of five percent protein as supplied for use. Two litres per day would be required to provide 100 grams of protein. Patients find that infusions of *amigen* cause nausea unless they are given very slowly. It will usually take three hours to inject one litre, so that two litres per day may require too much time and may overtire the patient.

Therefore before and after less severe operations one litre of *amigen* daily may be sufficient to compensate partially for the protein loss. The body tissues will be called upon to furnish whatever addition is necessary and hence considerable loss of weight will follow. Amino acids injected into the blood stream are mopped up more quickly than glucose.

Salt Ten grams of NaCl is the maximum quantity required by the body in 24 hours. The only reasons for more being needed will be inordinate sweating or vomiting or aspiration of gastric juice. Severe salt depletion may cause pylorus spasm and gastric atony. In acute dilatation of the stomach or in paralytic ileus, deficiency of NaCl. should be sought and corrected. After an operation the kidney's capacity to excrete salt may be impaired. This may be caused by the anesthetic, by increased adrenocortical activity or by hypoproteinaemia. Therefore it is wise to give very little salt in the first few days after operation. Usually *amigen* with two grams per litre, has enough salt to satisfy the body requirements without any saline additions. Whether or not enough salt is being given is best measured by the simple test for the salt content of the urine mentioned above. Less than three grams NaCl. per litre calls for saline infusion, more than five grams per litre indicates that no added salt should be given.

Carbohydrates: Five percent glucose in water forms a solution isotonic with the blood. Therefore this is the best vehicle for water and for carbohydrates; 100 grams of glucose daily is enough to prevent Ketosis. Hence 2 litres of five percent solution should be given each day.

Vitamins: A shortage of thiamin predisposes to circulatory failure. It is wise to add 10 milligrams of thiamin daily to the glucose infusion. Carbohydrate metabolism is impeded by a shortage of thiamin, riboflavin and niacin. Intravenous injection of glucose causes a rapid disappearance of these vitamin B components. A liberal allowance of thiamin is 10 mg., of riboflavin is two mg. and of niacin 100 mg. Vitamin C is rapidly extravasated into injured areas of the body. It is well known that this vitamin is required in high concentration to ensure sound healing. For these two reasons 1000 mg. of ascorbic acid should be added daily to the intravenous glucose solution. In cases of jaundice or of biliary fistula vitamin K should be given in sufficient quantity to bring the prothrombin time within normal limits.

Acidosis and alkalosis are likely to be corrected by the delicate gauges and compensating mechanisms of the body itself. In the vast majority of cases, attention to the fluid, protein, salt and vitamin needs as outlined above, will allow perfect control by the body of any tendency to acidosis or alkalosis. In severe alkalosis the normal mechanism for correction may be assisted by the inhalation of 30 percent CO_2 in oxygen. Severe acidosis may require more urgent treatment than alkalosis. The compensating methods of the body may be helped when necessary by 1.75 percent sodium lactate given slowly until the CO_2 combining power of the blood has risen to its normal level.

CONCLUSIONS

Water should be given to produce one litre of urine daily. Salt should be given to produce three to five gr. NaCl. per litre of urine. Protein may need speedy replacement by blood or by plasma, and in less urgent cases 100 grams daily are required. This amount is contained in two bottles of blood, in one bottle of plasma, or in two bottles of amigen. Sugar, 100 grams daily is necessary. Therefore give two litres of five percent glucose in water. Vitamins B and C normally to be given, K when indicated. Isotonic saline probably best avoided altogether.

RIASSUNTO

Consiglia la somministrazione di una quantità d'acqua sufficiente per l'eliminazione quotidiana di 1 litro d' urina: di sale, in modo da ottenere da 3 a 5 gr. di NaCL per litro d 'urina. Le proteine possono richiedere una rapida sostituzione con sangue o plasma; in casi meno urgenti, la richiesta si limita a 100 gr. al giorno. Questa quantita' e' contenuta in due bottiglie di sangue, in una bottiglia di plasma, o in due bottiglie di Amigen. 100 gr. di zuchero al giorno sono necessari: possono essere somministrati con 2 litri di una soluzione al 5% di glucosio in acqua. La somministrazione di vitamine B. e C. e' generalmente necessaria E' preferibile evitare l'uso di soluzioni saline isotoniche.

SUMARIO

Se debe de administrar agua en suficiente cantidad para producir un litro de orina al dia, y cloruro de sodio lo suficiente para producir una eliminacion de tres a cinco gr. por litro de orina. Las proteinas se administraran por transfucion sanguinea o por la administracion de plasma. Los casos de menos urgencia requieren 100 gr. de

proteina al dia, esta cantidad es equivalente a dos botellas de sangre, o una de plasma, o a dos botellas de amigen Tambien se debe de administrar 100 gr de glucosa diariamente en la forma de dos litros de cinco por ciento de glucosa en agua Las vitaminas B y C se debe administrar ordinariamente y la K cuando esta sea necesaria En cambio las soluciones isotonicas de cloruro de sodio se mejor el evitarlas completamente

SOMMAIRE

Il faut donner de l'eau en quantite suffisante pour produire un litre d urine par jour On donnera une quantite suffisante de sel pour produire trois a cinq gr Na CL par litre d urine La proteine sera remplacee par du sang ou par du plasma Dans les cas moins urgents, 100 gr par jour sont necessaires Cette quantite est contenue dans deux bouteilles de sang et dans une bouteille de plasma ou dans deux bouteilles D'Amigene, 100 Grammes de sucre sont necessaires, ainsi, on donnera deux litres d'eau ayant cinq pour cent de glucose Des vitamines B et C sont donnees normalement, on donnera des vitamines K si elles sont indiquees Il est preferable de ne pas avoir recours aux solutions salines isotoniques

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The International College of Surgeons

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A Clinical Survey of 113 Consecutive Cases on Tubal Pregnancy

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THE material in this survey consists of 110 patients who had between them 114 ectopic pregnancies. One of the patients had a bilateral ectopic and thus there were 113 operations performed in the series. Two of the patients appeared twice in the series and one, three times.

Age Incidence: Sixty-five percent of the patients were between the ages of 26 and 35; the youngest 19 and the oldest 46 (Table 1).

Parity: Seventy-five percent were multiparae; 22 percent were nulliparae and only three percent had a previous ectopic gestation. One patient had three ectopic pregnancies and no intra-uterine pregnancy. Two had two ectopic pregnancies and no intra-uterine pregnancy, and four had a previous ectopic pregnancy and intra-uterine pregnancies. There were in all eight recurrent ectopic gestations operated on but only two appeared twice in the series and one, three times. Twenty-four patients had had previous abortions, only 16 of them had one abortion and eight patients had more than one (Table 2).

TABLE 1

Age Incidence

16-20 years	4
21-25 years	8
26-30 years	36
31-35 years	38
36-40 years	18
Over 40 years	9
	113
Youngest	19 years
Oldest	46 years

Time Interval Since Last Pregnancy: Great stress has been laid by many authors on the fact that most ectopic pregnancies are preceded by a fairly long period of secondary sterility but in recent years some authors have tended, from their figures, to discredit this finding. Langmann and Goldblatt in 1939 said that undue emphasis has been placed on the sterility period preceding the occurrence of an ectopic, and Fitzgerald and Brewer in 1935, in a review of 500 cases from the Cook County hospital, Chicago, found that a long period of sterility preceding the ectopic gestation was not the rule in their cases. In my series two-thirds out of 81 cases, in which information was available, had a period of secondary sterility existing for more than three years and the average time interval since the last pregnancy in the whole series was six years and one month. The minimum period of sterility seen in this series was six months and the maximum 16 years.

TABLE 2

Parity

Nulliparae	24
Previous ectopic only	3
Gravida 1	33
Gravida 1+ 1 ectopic	1
Gravida 2	18
Gravida 3	8
Gravida 3 + 1 ectopic	3
Gravida 4	5
Gravida 5	6
Gravida 6	2
Gravida 9	1
Gravida 10	1
Gravida 12	1
No information	7
	113

Previous Operations: The unduly high incidence of previous abdominal and especially pelvic operations in cases of ectopic pregnancy has been noted by several writers. Twenty three percent of my patients had had previous pelvic or abdominal operations six of which were for ectopic gestation. It is rather surprising perhaps that only two, or possibly three, had undergone a previous operation for pelvic inflammation (Table 3).

TABLE 3

Previous Operations

Operation for previous ectopic pregnancy	6
Appendectomy	6
Appendectomy ectopic gestation	1
Appendectomy intestinal obstruction	1
Cesarean Section	3
Dilatation and Curettage	3
Insufflation of Fallopian tubes	2
Drainage of pyosalpinx	1
Drainage of pelvic abscess	1
Salpingectomy (reason unknown)	1
Myomectomy	1
	26

Pulse Rate Table 4 shows the pulse rate findings for the series and it will be seen that, generally speaking, cases of tubal mole have a normal pulse rate while only in the severe forms of ectopic gestation is the pulse rate excessively quick or imperceptible. However, there are exceptions for in one of the cases of ruptured ectopic gestation which came to the operating table with a pulse rate of 72, I found four pints of fluid blood in the abdomen.

TABLE 4

Pulse Rate

	Mole	Abortion	Rupture	Total
Less than 70	1	0	0	1
70-80	3	10	8	21
81-90	6	6	16	28
91-100	1	9	19	29
101-110	1	2	5	8
111-120	0	1	4	5
121-130	0	2	6	8
131-140	0	0	3	3
Over 140	0	0	2	2
Imperceptible	0	0	8	8
	12	30	71	113

Temperature It is a common feature in surgical teaching to stress the gravity of the severe case of ruptured ectopic gestation, with most of the students entering practice with the idea that the words "ectopic gestation" are synonymous with the pale, collapsed, cold, pulseless patient. This is not true. Table 5 shows that more than half of the patients in this series had a temperature of 98.4° F, or higher, and yet the majority of cases were of the ruptured variety. The presence of free blood in the peritoneal cavity for any length of time is almost always associated with a rise in temperature and almost all the cases in this series, including those with a sub normal temperature before operation, had some degree of pyrexia for the first few days after operation and yet peritonitis occurred only in one.

TABLE 5

Temperature
(in degrees Fahrenheit)

	Mole	Abortion	Rupture	Total
Subnormal	4	7	37	48
98.4-99	3	9	16	28
99.2-100	3	8*	16	27
100.2-102	0	6	2	8
No information	2	0	0	2

*Includes one patient also suffering from influenza

Abdominal Pain This was the most constant symptom found and was present in 97 percent of cases. In many patients it was very severe and was usually situated in the lower abdomen and both iliac fossae.

Shoulder Tip Pain (Kehr's Sign) To my mind this is one of the most important symptoms in ectopic gestation and for some reason or other it has been completely neglected in gynecological textbooks. Its mechanism is well understood, namely—irritation of the under surface of the diaphragm and the reference of pain through the phrenic nerve and its connections with the third, fourth and fifth cervical segments, these same segments supplying the skin over the tip of the acromion. It is the most classic example of referred pain known and has received great prominence from general surgeons in my country, in particular—Hamilton Bailey, John Morley and Zachary Cope, but it has been almost completely neglected by gynecologists. Certainly it does not appear in ruptured ectopic gestation with the frequency that it appears in ruptured ulcer but excluding 15 of my cases in which there was no information it was found to be present in 60 percent of ruptured ectopic gestations and in 41 percent of the whole series.

It will be seen from Table 6 that the situation of the shoulder tip pain is no guide to the side on which the pregnancy is present. It is most frequently associated with those cases where a large amount of blood is present in the peritoneal cavity. One of the patients in my series was diagnosed correctly on the finding of this symptom alone. She was admitted to the hospital complaining of abdominal pain and a diagnosis of gastritis was made. When examined by the Resident Medical Officer she was asked to sit up while he listened to the back of her chest. She offered the information that the pain in the tip of her shoulder had now disappeared. He immediately laid her flat again and she said that the pain reappeared. He asked me to see her and I found on questioning her that she had suffered a period of amenorrhoea and very recent, slight vaginal bleeding. On opening the abdomen I found a ruptured ectopic gestation with two and one-half pints of free blood in the abdominal cavity.

Other Sites of Referred Pain: There are other sites to which pain may be referred, in particular the rectum. The desire to defecate, associated with collapse on straining, is the so called "bathroom sign" which has been so frequently stressed in American literature. It was present in seven patients of this series on eight occasions. In one it occurred with two successive ectopics and its recurrence on the second occasion led to a very swift and accurate diagnosis by her own doctor. This recurrence of symptoms of the same nature has frequently been noted in repeated ectopic gestations and in one case of mine, in whom three consecutive ectopic gestations occurred, the patient herself diagnosed her condition. On the third occasion she presented herself at the hospital without consulting her family physician.

TABLE 6

Shoulder Tip Pain

7 left sided ectopics had pain in the right shoulder
6 right sided ectopics had pain in the right shoulder
1 right sided ectopics had pain in the left shoulder
3 left sided ectopics had pain in the left shoulder
7 right sided ectopics had pain in both shoulders
0 left sided ectopics had pain in both shoulders
No information in 16 cases as to which shoulder the pain was experienced.

Vaginal Bleeding: This was present in 82 percent of my cases and was almost always slight, except in two cases where it was very severe and more in keeping with the bleeding seen in an incomplete abortion. The origin of the bleeding is from the uterine mucosa due to separation of the decidua and its absence means either that the decidua has not separated or that there is a coexisting intrauterine pregnancy.

Amenorrhoea: Amenorrhoea was present in 82 of these patients and the average duration was six weeks; the maximum period was 16 weeks. It is the most difficult symptom to elucidate accurately as there is a great tendency for the patient to confuse irregular vaginal bleeding, associated with the passage of the decidua, with a normal period.

Palpable Mass: The presence of a mass, since this always consists of blood clot, depends on the length of time in which bleeding has taken place before the patient is seen and on the rate at which bleeding occurred. If bleeding has been severe and fast then the patient will be diagnosed and operated on before large clots have had time to form. In this series a palpable mass was found in 17 percent of ruptured ectopics, in 63 percent of tubal abortions and in 75 percent of tubal moles.

Previous Pelvic Inflammation: Unfortunately only a very few of the tubes removed in this series were subjected to histological examination. In three, microscopic evidence of previous tubal infection was present; in 24 there was macroscopic evidence of previous pelvic infection. Macroscopic evidence of endometriosis was not seen in this series, although such may have been present if a routine histological section of the tubes had been carried out.

Pallor: In the ruptured variety, facial pallor was a common finding and in many was very striking.

Nausea and Vomiting: This was frequently seen in the series but did not appear to be due to pregnancy as its onset usually coincided with the disruption of the pregnancy.

Abdominal Rigidity: This was never seen. In the opinion of myself, and my colleagues in Newcastle, whose experience of ectopic gestation is quite large, it never occurs. Rather is there a fullness in the lower abdomen which is soft but tender on palpation and appears to be very characteristic of this disease.

Shifting Dullness: This was seen in more than half the patients with large amounts of blood in the peritoneal cavity and excessive vaginal tenderness was noted in every single case.

Cullens Sign: This sign [illegible] first described by T. S. Cullen of Baltimore [illegible] 1918, consisting of bruising of the abdominal wall often in the region of the umbilicus [illegible] seen once in this series. As I have shown [illegible] paper on this subject, it is not pathognomonic of ectopic gestation but may occur in any condition giving rise to intraperitoneal bleeding and also from hemorrhage in the rectus sheath. It is also seen in acute pancreatitis but when present it is highly significant [illegible] ruptured ectopic gestation as this is by far the commonest condition in which it is seen.

Treatment: Treatment has been operative in every case and the aim has always been to do the least surgery compatible with saving the patient's life. Unilateral salpingectomy was performed in 81 cases and in 22 cases the ovary as well as the tube was removed. This was sometimes due to the fact that in a long standing case the tube and ovary were matted together, but with increasing experience I have found that it is quite possible to conserve the ovary and I greatly deprecate the wholesale removal of ovaries in order to facilitate the ease of operation unless the patient's condition is so very serious that the saving of time is of vital importance.

Above all I deprecate the performance of appendictomy as an additional procedure, for no matter how carefully the operation is performed, some blood must remain in the peritoneal cavity and to open any part of the intestinal tract in such a condition is fraught with danger. Treatment of the tube on the opposite side is of great importance. For the most part in this series exploration to make sure it was not the seat of coexisting ectopic pregnancy was all that was done. It has been frequently urged that if diseased, the opposite tube should be removed, but the interpretation of the signs of disease should be most carefully considered.

Mayo and Strassmann have pointed out that the non-pregnant tube undergoes certain changes in more than 50 percent of tubal pregnancies, such as swelling and redness which are due to peritoneal friction produced by haematomas. These changes disappear and do not interfere with subsequent fertility. The status of the remaining tube is of paramount importance to the patient, especially if she be childless and the chances of a second ectopic gestation are considerably less than those of an intra-uterine pregnancy.

Salpingostomy is only justified if the patient is particularly anxious to have a child and her condition warrants this. I performed this once in the series. I had previously removed this patient's right tube for a ruptured ectopic gestation when she was gravely ill. On a second occasion when her condition was not so serious I performed salpingostomy and this was followed by a third ectopic gestation. On this occasion she was not seriously ill at all and I removed the ectopic pregnancy, resected the uterine cornu and reimplanted the tube into the uterus. It is now two years since I performed this operation but no further pregnancy has taken place.

Blood Transfusion: The value of blood transfusion in certain types of ectopic gestation is very great indeed. Twenty-[illegible] patients in this series received blood and it is no exaggeration to say that [illegible] of these would not have survived without it. [illegible] them were completely unconscious and operation was started without an anesthetic. Blood transfusion was started at the same time and in each patient it was necessary to give gas and oxygen in order to sew up the abdominal wall.

In the early part of this series reliance was placed on autotransfusion but with the introduction of stored blood this method was discarded on account of the fact that it is somewhat time consuming to collect and filter blood from the patient's abdominal cavity, adding to the length of time during which the abdomen is open. Where, however, stored blood is not available this is an extremely valuable manoeuvre. Plasma was used in one case but it was of no value and it was used purely as a temporary measure.

I believe that if intravenous fluid is necessary, blood should always be used and that where the loss has been very severe, this should be transfused at a quick pace. My own procedure is to give the first pint in no more than 15 minutes, the second and third pints can be run in at a slower rate and in patients gravely ill I have used more than one limb at the same time in order to restore the circulation quickly. Many of my patients who did not receive transfusion at operation were transfused post-operatively and I found their convalescence was greatly shortened and I believe it is desirable to transfuse all patients whose hemoglobin after operation is below 60 percent.

Transfusion and operation should start together and I cannot agree that any time at all should be spent in allowing the patient to recover from the so called "shock." I have watched very closely the progress of more than 40 seriously ill patients during the time that preparations were made to operate on them and despite transfusion I never saw one improve until the operation was commenced. On the other hand I have seen several patients who have begun to improve the moment the abdomen was opened, despite the fact that at that time they were not receiving blood. Only in very exceptional circumstances, if there is unavoidable delay, should time be wasted in transfusing before operation.

Anesthesia: For the gravely ill patient, the best anesthetic of all is local infiltration. This can be supplemented if necessary with gas and oxygen and if the anesthetist is not particularly experienced and local anesthesia is not available, there is, in my opinion, no safer anesthetic than open ether. There were two deaths in this series—a mortality of 1.76 percent.

Case 1: (59th case in the series). The patient, an unmarried woman, age 41, was treated by unilateral salpingectomy. The entire operation took no longer than 15 minutes. The patient's condition was not serious and she remained well for two days after the operation. She then developed peritonitis and despite treatment with sulphonamide she died within three weeks. Penicillin was not available at this time.

Case 2: (107th in the series). This patient had a ruptured ectopic gestation which had been present for 12 hours before admission and her condition was very poor. There was considerable delay in getting her into hospital and also in getting an operating theatre. Blood transfusion was started before operation. Owing to extreme vasoconstriction the resuscitator failed to get in more than a few ounces of blood before operation was commenced and the sucker which I was using broke down and the abdomen had to be swabbed out by hand. This added another 10 minutes to the operation and necessitated some handling of the gut. During this procedure the patient stopped breathing and the heart stopped beating. Artificial respiration and cardiac massage failed to restore life.

Subsequent Pregnancies: Mayo and Strassmann found the chances of a subsequent intra-uterine pregnancy were 33.3 percent and the chances of a subsequent extra-uterine pregnancy were 3.6 percent, which shows the importance of conserving the remaining tube, unless it is grossly diseased. In view of this statement a follow-up of the cases in this series was undertaken and it was found that the chances of a subsequent intra-uterine pregnancy were more than three to one. Total patients—110; eight were too recently performed to allow the possibility of a further pregnancy; two died; 15 were sterile as a result of operation. This leaves 85 in whom a subsequent pregnancy was possible; 27 were untraced or did not reply; 58 were traced.

The husband of one patient was taken a prisoner of war in France three weeks after his wife's operation and therefore the outcome of 57 patients who had a chance of pregnancy is known Of these 57, the case treated by salpingostomy had two subsequent ectopic *gestations and two others had one ectopic* gestation—5.2 percent

Eleven patients had 13 intra uterine pregnancies between them—19.2 percent, eight had one pregnancy, two had two pregnancies and one had an abortion at three months It is of interest to note that three twin pregnancies occurred in this series One had a bilateral ectopic, one had a twin pregnancy in the one tube and one had a tubal pregnancy *combined with an intra uterine pregnancy* This latter was recognized at operation, continued to term and resulted in the birth of a living child

A Surgical Motion Picture Evaluation Committee of the International College of Surgeons is now being formed.

Those who have had experience in this line and who would like to participate in this activity will kindly communicate with the Secretary, 1516 Lake Shore Drive Chicago, Ill

An Analysis of 793 Cataract Operations by the Verhoeff Intracapsular Sliding Method

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IT WAS only some 25 years ago that intracapsular cataract surgery became popular. There was still considerable controversy as to which type of cataract the operation could be applied to. In fact there were many leading surgeons who did not approve of the operation and stated frankly that it was dangerous, and that results of such operations were unfavorable compared with the traditional cataract operation.

The traditional cataract operation required that the eye be blind so as the cataract would be mature or "ripe," and that the operation be done in two or three stages. These procedures occupied four to six months and the patient had an irritable eye for many many weeks. Hospitalization commonly extended over a month and many patients waited years for their cataracts to ripen.

With the advent of the intracapsular operation, the surgery of cataracts took a tremendous stride. Patients could now be operated on while the cataracts were quite immature. The postoperative recovery time was shortened to weeks instead of months. The ultimate results of the intracapsular operation had proven its superiority in every manner over the old operation.

Development of the intracapsular operation was due to such men as Smith,[1] Barraquer,[2] Stanculeanu,[3] Kalt,[4] Elschnig,[5] Verhoeff[6] and Knapp.[7]. As a result of their research there were three main types of operation developed: the Sliding Method, the Tumbling Method, and the Suction Method. Of these three methods the Tumbling Method, as advocated especially by Knapp, is the most widely used. The Suction Method by various types of erisophake is least used but popular with some surgeons. It is the purpose of this report to present an analytical survey of approximately 800 operations by the Verhoeff Method so that other surgeons using different methods, may compare results.

It must be made clear at this point that the writer is of the opinion that it is not necessary to select cases for intracapsular surgery by the Verhoeff Method. Cataract patients of 40 years of age or older, regardless of the presence of high myopia, posterior synechiae, or any other complication, have routinely been operated on by the intracapsular method. This survey does not include cataract cases in patients under 40 years of age as they are not attempted by the intracapsular operation; nor does it include cases of traumatic cataract where the lens capsule has already been ruptured by penetrating injury.

CHOICE OF ANESTHESIA, PREMEDICATION AND PREPARATION

The delicacy of intracapsular surgery demands that the patient must be relaxed and quiet during the operation. The surgeon is wise who studies his patient before admission to hospital from the standpoint of the patient's mental state and nervous control. In younger patients (55 years and under) particularly if the cataract is complicated by a coexisting disease, the writer usually uses general anesthesia of sodium pentothal intravenously with the trachea intubated to allay the dangers of laryngeal spasm or respiratory failure. More recently curare has been used successfully with the sodium pentothal, in which case much less pentothal is necessary and the patient is carried along on a much lighter anesthesia.

Premedication consists of hypodermic injection of pantapon gr. 1/3 and atropine gr. 1/150.

About 90 percent of cases are operated on under local anesthesia. Premedication consists of luminal gr. 3. two hours before the operation and demerol gr. 50. intramuscularly one-half hour before surgery.

Sodium sulfacetamide 30 percent solution and penicillin solution 1500 units per cc. are instilled in the eye to be operated five times alternately 24 hours prior to surgery. The lashes are clipped immediately before surgery. The skin preparation consists of washing with green soap; application of alcohol; final thorough scrubbing with tincture of zephiran and careful painting of the lid margins with tincture of zephiran. Aqueous zephiran 1/1000 is instilled into the eye.

Pontocaine one percent solution instilled every two minutes for six times is used to anesthetize the eye. A Van Lint novocaine two percent solution injection of 5 to 7 cc is given for lid relaxation No retrobulbar injection of novocaine is used. The writer has never seen the necessity for this procedure and objects to its use in that a retrobulbar hemorrhage can be produced necessitating cancelling the operation, or, that such an injection can in some cases produce a pressure in the orbit and consequently on the eye, making loss of vitreous a grave danger if not an actuality.

OPERATIVE TECHNIC

Following the Van Lint novocaine injection, upper and lower lid retracing sutures are placed. The sutures are of heavy silk and placed in the middle of the upper and lower lids with a broad bite only subcuticular in depth and just behind the lash line.

An eye speculum is inserted and the eye and the upper and lower fornices are thoroughly washed out with normal saline. Several drops of pontocaine solution one percent and adrenalin 1/1000 are instilled.

The tendon of the superior rectus muscle is grasped at its attachment and a heavy silk suture passed beneath the tendon of the muscle just before its attachment. This suture is for retraction. The eye speculum is removed. The upper lid retracting suture and the superior rectus suture are brought up over the patient's forehead and anchored in the drapes with mosquito forceps From this procedure the upper lid is raised off the eyeball and the eyeball is gently depressed. The lower lid retracting suture is brought down over the patient's cheek and heavy hemostat forceps applied to the ends of the suture but not clamped to the drapes. The weight of the forceps is sufficient to cause the lower lid to be lifted away from the eye.

An inspection is now made of the external canthus and if any pressure on the eye is evident an external canthotomy is done with scissors. A suture for closing the canthotomy is now placed but not tied This obviates any danger of trauma to the eye after the cataract extraction

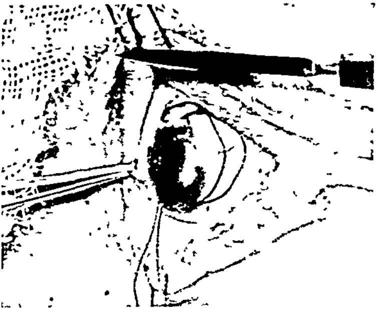

Fig. 1. Illustration shows the upper and lower lids retracted by the retracting suture, the superior rectus suture in position, retracting the eyeball downward The scleral conjunctival suture has been placed with conjunctival flap brushed down over the cornea, and the sutures drawn aside to be out of the way during the rest of the operation. The internal rectus has been grasped for fixation and the cataract section is about to be done.

CATARACT SUTURES

Some years ago I was enthusiastic about elaborate corneoscleralconjunctival sutures, thinking that with such sutures wound closure would be in perfect apposition and strong. It was hoped that from such sutures the postoperative complications, such as iris prolapse, vitreous loss and intraocular hemorrhage, could be avoided and further that astigmatism would be much less than with other types of sutures.

The corneoscleralconjunctival sutures were applied in two manners. First, as a single suture at 12 o'clock; secondly, as a double suture, one at 11 o'clock and the other at 1 o'clock. In both cases the conjunctiva was incised at the limbus from 10 to 2 o'clock and the conjunctiva undermin isse to form a large loose flap which could readily be drawn down over the cornea; 6-0 atraumatic silk sutures were used. The needle was introduced in the cornea about 2 or 3 mm. from the limbus, passed through the corneal stroma and limbus and superficial layers of the sclera, emerging in the sclera 3 or 4 mm. from the limbus.

The section was made with a knife and enlarged with scissors, if necessary. If the iris became incarcerated during the section the knife was withdrawn and the section completed with scissors. The section, of course, divided the sutures which had been placed.

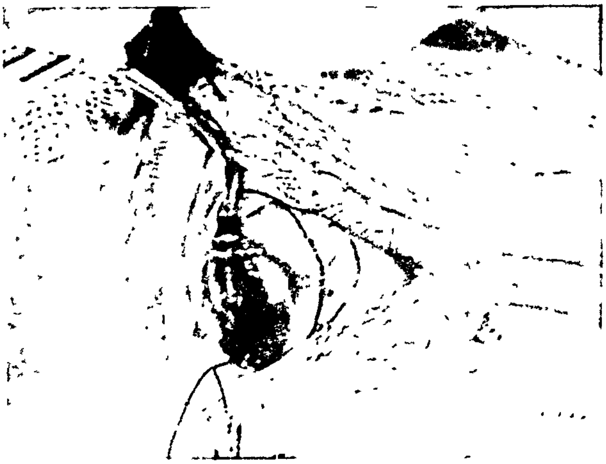

Fig. 2. The cataract section completed. The iris has been grasped at the sphincter and been drawn through the incision and the iridectomy is about to be completed.

These sutures were now used as suture tracts to allow new sutures to be reintroduced. The new sutures were double-armed 6-0 atraumatic silk. The suture was passed first along the corneal suture tract and then introduced at the scleral lip of the wound and along the scleral suture tract. The ends of the sutures were then brought through the conjunctival flap from the under side about 5 mm. from the edge of the flap. Such sutures, when tied, should theoretically result in perfect wound apposition. The technical performance in the placing of such sutures was often extremely difficult. The writer frequently found that placing such sutures was by far the most difficult part of the operation and the most time-consuming.

It was found that there was considerable danger in the technic to a threatened loss of vitreous before the extraction was even commenced due to the pressure on the eye when attempting to introduce the sutures in the suture tracts—particularly in the case of the scleral suture tract. One hundred and eleven cases were done using the double suture at 11 o'clock and 1 o'clock and 64 cases of the single suture at 12 o'clock.

At the same time as these sutures were being employed the writer was also using two simpler sutures, and it became apparent that the complicated corneoscleralconjunctival sutures were not improving the results of the surgery as had been expected. Technically, they were most difficult to use; the danger of vitreous loss on attempting to introduce the sutures made them unattractive and they were abandoned in favor of a simpler type of suture.

Thirty-two cases were done using the scleral-conjunctival suture devised by the late Dr. George Derby, Boston, Mass. An incision was made in the conjunctiva at 12 o'clock 1 cm. above the limbus. A triangular flap was cut to the limbus, the base portion on the limbus being about 1 cm. wide. A double-armed 6-0 silk suture was used. The two ends of the suture were passed through the base of the conjunctival flap about 5 mm. apart emerging on the under side of the flap. Each needle was then passed vertically in a 2 mm. bite through the superficial layers of the sclera commencing about 3 mm. from the limbus. The sutures were left loose between the flap and the scleral bites and drawn to the lateral side so as to be out of the way of the knife during the section, iridectomy and cataract extraction.

Following the extraction, the two scleral ends of the suture were drawn closing the wound. The conjunctival flap was smoothed over and the sutures tied over the tip of the conjunctival flap. The writer frequently found it was difficult to draw the sutures without causing the scleral lip of the wound to gape and caused concern over a vitreous loss following extraction. As this type of suture was the same in the end result as one proposed by Dr. F. H. Verhoeff, Boston, Mass., it was abandoned due to the fact that it was more difficult to insert than the Verhoeff suture.

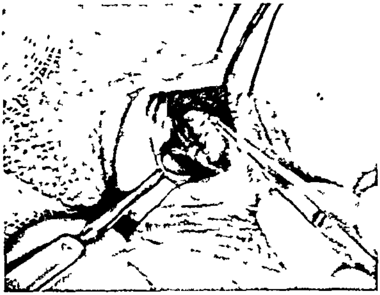

Fig 3 The delivery of the lens in capsule is shown As may be noted the lens is grasped at the equator and as the lens emerges, it is held against the scleral lips of the incision to prevent loss of vitreous The ring expressor is following immediately behind the lower pole of the lens Note the retraction of the lids, removing all pressure from the eyeball

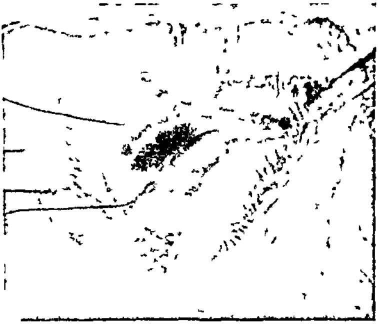

Fig 4 The cataract has been removed in capsule, the conjunctival flap has been smoothed over and the sutures have been drawn to The iris is now being reposited The sutures will then be tied and the retracting sutures removed

For the past several years the Verhoeff suture has been employed exclusively except in cases of glaucoma with filtering trephine or iridencleisis blebs where the double corneoscleralconjunctival suture was better applied A triangular flap, similar to the Derby suture was used A double armed 6 0 silk suture was used A bite was taken in the superficial layers of the sclera about 3 mm long and parallel to the limbus about 3 mm posterior to it Either end of the suture was then passed through the base of the conjunctival flap from the under side and about 3 mm apart The sutures were drawn to the lateral side to be out of the way

Following extraction the sutures were drawn, holding the conjunctival flap down with forceps, to prevent gaping of the wound from the corneal lifting Five hundred and eighty six cases are reported using this type of suture It is simple and fast, trauma to the eye is minimal and wound closure is adequate Table 1 shows comparative results in 793 cases using the four types of sutures mentioned above

From the figures in Table 1 it is quite apparent vitreous loss is impressively lower with the Verhoeff suture The writer is of the opinion that this suture cannot produce a vitreous loss by the trauma of introduction, and will in many cases prevent vitreous loss following extraction because of the simplicity and rapidity with which the sutures may be drawn and tied The higher figures of the other types of suture are in part due to the actual loss of vitreous occurring before lens extraction was commenced

It is also interesting to notice that the complication of prolapsed iris has the lowest incidence with the Verhoeff suture

The occurrence of hyphema on the third to fifth day postoperatively, was of minor consequence This complication occurring in about 20 percent of cases does delay slightly the postoperative recovery but produces no permanent ill effects No attempt was made in this survey to study this unimportant occurrence There were, however, 14 cases of severe massive intraocular hemorrhage Two of these cases were expulsive hemorrhages and required immediate enucleation Two cases occurred where retinal detachment was found after the hemorrhage absorbed The nine other cases were massive vitreous hemorrhages, recovering with 20/40 vision or better after a period of approximately six months The other case developed a degenerated vitreous and phthisis bulbi with nil vision

A study was made of [illegible] astigmatism of the postopera[illegible] th the

TABLE 1

Type of Suture	No. of cases	Vitreous Loss %	Prolapsed Iris No. of cases	Severe Hemorrhage No. of cases	Average Astigmatism in Diopters
Corneoscleral-Conjunctival Single	64	10.94	1	1	2.980
Corneoscleral-Conjunctival Double	111	5.4	3	4	2.069
Scleral Conjunctival Derby	32	6.25	1	1	2.068
Scleral Conjunctival Verhoeff	586	2.56	5	7*	2.242

*2 cases of expulsive hemorrhage which required enucleation.

different sutures which shows very little relative difference in the amount of astigmatism.

The controversy regarding round pupil with peripheral iridectomy cataract extractions versus the full iridectomy extraction still continues. There is no doubt that the round pupil operation makes a prettier eye postoperatively. One must remember, however, that the resulting vision is unaffected with or without iridectomy. Therefore, the surgeon should think of the ultimate visual result, and if the operation is rendered easier and safer with iridectomy then iridectomy should be done. For those surgeons who do the Tumbling Method of extraction the question of iridectomy is not so important as in that operation iridectomy does not facilitate the extraction of the cataract to any great extent.

In the Verhoeff Sliding Method of extraction where the capsule forceps are applied at 12 o'clock, at the equator or just below the equator of the lens, it is important that the operator have a good view of the lens equator and also that the iris be out of the way to allow the dislocation of the lens at 12 o'clock forwards. It is frequently difficult to obtain a fully dilated pupil by the use of weak mydriatics preoperatively such as adrenalin and cocaine. If a round pupil extraction is to be done the mydriasis must be readily controlled and a full miosis obtained quickly postoperatively by the use of eserine.

In many cases which are fully dilated immediately preoperatively, the operator finds that by the time the section is completed the pupil is only two-thirds dilated or even less. Any case which is not fully dilated following section makes round pupil extraction by the Verhoeff Method practically an impossibility. Whereas in the Tumbling Method it is possible to reach beneath the iris to grasp the lens if the pupil is not fully dilated: in the Verhoeff Sliding Method, the iris must be brushed back or held back by some instrument to allow a proper grasp on the lens capsule.

In incompletely dilated pupils it is almost impossible to hold the iris back to allow a proper grasp at the lens equator. For this reason the writer has always felt that iridectomy greatly simplified the operation and therefore, was the procedure of choice. Recently, however, some 22 cases have been done with round pupil and peripheral iridectomy using the Sliding Method. They were all selected cases, namely—patients over 60 years of age with mature or nearly mature cataracts. In one case the capsule was ruptured. It is the feeling of the writer that the Verhoeff Sliding Method is not too well adapted for round pupil extractions. The manipulation of the iris during the lens extraction makes the technic more complicated, and *it is doubtful if round pupil* extractions by this method as a routine procedure would show the same high percentage of uncomplicated intracapsular extraction as that obtained by a full iridectomy.

In these cases presented the Verhoeff capsule forceps were used. Following iridectomy, pressure is applied with a ring expressor at 6 o'clock just above the limbus. This results in a tipping forward and upwards of the lens equator. The capsule forceps are then applied as the pressure is maintained below. *The operator has an unobstructed view of the lens* and a proper bite of the lens capsule should always be possible. Traction by the forceps upwards and outwards is applied and maintained. The ring expressor is now slid in a semicircular manner from 5 to 7 o'clock just above the limbus, the pressure in the direction of the optic nerve. This action results in a dislocation of the lens at the upper and lower poles. The traction of the forceps is now changed to the plane of the iris, resulting in

TABLE 2

Age group	40 to 45	46 to 50	51 to 55	56 to 60	61 to 65	66 to 70	71 to 75	76 on	Total of all cases	% of all cases
No. of cases	25	46	71	86	135	167	133	130	793	
% Intracapsular	76	78.3	84.5	83.7	85.2	89.2	95.5	92.3		87.8
Vitreous Loss	2	1	1	2	8	5	7	3	29	
Vitreous Loss %	8	2.2	1.4	2.3	5.9	3	5.3	2.3		3.7
Diabetes Mellitus No. of cases	0	3	4	11	5	8	4	4	39	4.9
Diabetic Retinitis				5	5	3	2	1		
High Myopia over 50 No. of cases	0	4	4	10	20	10	11	10	69	8.7
Myopic Choroiditis No. of cases	0	0	0	0	10	3	2	3	18	2.3
Postop. Retinal Detachment No. of cases	0	0	1	1	2	1	2	0	7	9
Postop. Glaucoma No. of cases	0	0	0	2	1	3	0	0	6	75
Severe Postop. Hemorrhage No. of cases	0	0	1	1	3	4	2	3	14	1.8
Severe Postop. Uveitis No. of cases			1	2	1	3	1	1	9	1.1
Vision better than 20/40	88%	98%	98.6%	91.9%	86.7%	92.2%	88%	89.3%		90.8%

the capsule and lens closing the scleral lip of the wound and blocking the possibility of vitreous presenting.

With the forceps traction in this plane a rocking motion is begun with a corresponding sliding pressure applied to the lens equator below by the ring expressor. That is to say when the lens is rocked to 1 o'clock above, the pressure below is at 7 o'clock and when at 11 o'clock above, the pressure below at 5 o'clock. In this manner the lens usually delivers rapidly through the wound, and when half delivered the pressure below is rapidly decreased so that in the final stage traction alone delivers the lens; the expressor follows behind to close the wound as the last of the lens is delivered.

The conjunctival flap is smoothed over with fine plain forceps and the flap held in position as the sutures are quickly drawn to and tied. The iris is reposited and the pillars massaged into good position and the wound lips inspected for invaginated conjunctiva. The superior rectus suture is carefully removed, as is also the lower lid retracting suture. Atropine, sulfadiazine, and penicillin ointments are instilled. The upper lid retracting suture is brought down on the cheek below and anchored with adhesive. Double dressings and a cataract mask are applied.

ANALYSIS OF TABLE 2

It is interesting to note first the relative incidence of cataracts according to age groups. After the age of 60 the incidence of cataracts is relatively constant in the different age groups.

The percentage of cases of cataract which were successfully removed intracapsularly certainly reflects the strength of the zonular fibers in the younger age groups. In those patients under 50 years about 77 percent were removed in capsule; from 50 to 60 years age group about 84 percent were removed in capsule; from 60 to 70 group about 87 percent were removed in capsule; and the age group from 70 years on about 94 percent were removed in capsule. While it is common knowledge that the older the patient—the easier it is to remove cataracts intracapsularly, it is gratifying to see that in the younger age groups the operation can be performed in such a high percentage of cases.

It is difficult to draw conclusions from an analysis of the cases of vitreous loss. Perhaps in the age group 61 to 65 where there were 20 cases of high myopia the 5.9 percent vitreous loss is suggestive. The writer feels that vitreous loss is caused almost always by two factors; first, that the patient was uncooperative and moved the eye at the wrong moment, or secondly, the surgeon made an error in technic. As regards the first factor, it might be said that the surgeon should be blamed again for wrong choice of anesthetic, or improper premedication, or poor akinesia of the lids or pressure on the eye from the external canthus, or retracting sutures held too tightly. The overall average of 3.7 percent vitreous loss is favorably comparable with any other intracapsular operation and perhaps illustrates the safety of the Verhoeff operation when attempted routinely at any age, forty or over, on any cataract immature to hypermature, complicated or uncomplicated.

Table 2 indicates the greatest incidence of diabetes mellitus associated with cataracts to be between the ages of 56 to 70 age groups. The complication of diabetic retinitis is a serious one and often its presence gives a disappointing result to surgery. However, where the fundi cannot be examined because of cataracts in a diabetic and surgery is done, the patient is seldom disappointed even if the vision is 20/70 due to diabetic retinitis. A further analysis is presented later on regarding diabetes mellitus and cataract.

As Table 2 reveals—the incidence of high myopia regarded in this survey as over five dioptres of myopia is 8.7 percent. In 69 cases it was found that 26 percent of these had myopic choroiditis, which in most cases gave them a postoperative vision of worse than 20/40. Figures are apt to be misleading and in this instance there were many cases where the patient's vision was reduced to less than 5 percent preoperatively and the vision postoperatively, while worse than 20/40, was eminently satisfactory to the patient. However, in the age group 61 to 65 where there were 20 cases of myopia of whom 10 had choroiditis, the visual result of the age group was reduced to 86.7 percent mainly by these myopes.

There were only seven cases of retinal detachment found postoperatively. Only one case occurred associated with myopia Two cases occurred following a vitreous loss at the time of operation Two were successfully reattached by operation

Six cases of glaucoma occurred They were all of the chronic compensated type and the onset appeared from three months to two years following cataract extraction It was possible to control all cases by a cyclodialysis operation

The analysis of the visual results in the age group 40 to 45 shows that while only 88 per cent had good vision, in this small group of 25 cases were two cases found to have old retinal detachments and one case of old occlusion of the central retinal artery These three cases materially reduced the percentage of successful results but also illustrate the misplaced enthusiasm the surgeon sometimes has when faced with a younger patient who has a mature or hypermature cataract in only one eye and rather faulty light projection However, when such eyes sometimes result in 20/20 vision one may be excused perhaps for the unsuccessful cases

The next two age groups 46 to 50 and 50 to 55 show very gratifying visual results which are due to the low incidence of high myopic choroiditis and diabetic retinitis The remainder of the age groups show a rather uniform visual result

The overall average visual result of 90 8 percent is in the opinion of the writer a very gratifying one, considering again that all types of cataract, regardless of complications, are used

TABLE 3

Number of cases	96	%
Vitreous Loss	9	9 4
Prolapsed Iris	3	3 1
Preexisting glaucoma	1	
Diabetes Mellitus	4	4 2
Diabetic Retinitis	4	4 2
Severe Postop Hemorrhage	3	3 1
Myopic Choroiditis	2	2 1
High Myopia	4	4 2
Severe Postop Uveitis	7	7 3
Sympathetic Ophthalmia	1	
Postop Glaucoma	1	
Vision worse than 20/40	22	22 9
% of vision better than 20/40		77 1

TABLE 4

An analysis of extracapsular extractions which resulted in vision worse than 20/40 The headings below represent the cause of poor vision and the number of cases

Number of cases	22
Vitreous Loss	3
Uveitis	7
Diabetic Retinitis	4
Postop Hemorrhage	2
Postop Glaucoma	1
Myopic Choroiditis	2
Preexisting Glaucoma	1
Old Optic Atrophy	1
Sympathetic Ophthalmia	1

There were 96 cases in which the lens capsule was ruptured during operation and Tables 3 and 4 show the results of these operations

Table 3 shows the high figure of 9 4 percent vitreous loss This illustrates well that frequently the surgeon is in trouble at the time the capsule ruptures and vitreous loss is incidental with faulty technic or the uncooperative patient Some cases of vitreous loss can also be attributed to the surgeon being overzealous in trying to remove lens remnants by irrigation or by fishing for capsule in the anterior chamber with forceps.

Three cases of prolapsed iris occurred—the percentage incidence being 3.1 percent, while in the intracapsular group of 697 cases the incidence was .5 percent.

Seven cases of severe postoperative iridocylitis occurred and the end result in each case gave a vision of less than 20/40. Practically all cases in this series of 96 had iritis of mild or moderate degree for weeks postoperatively. This of course emphasizes one of the main objections to the old extracapsular cataract extraction.

One case of postoperative secondary glaucoma occurred which could not be controlled medically or surgically and the eye was lost.

Table 4 explains the visual results of this group of cases. Operative and postoperative complications explain the poor visual result in 13 or more than half of the 22 cases having less than 20/40 vision.

As can be seen from Table 5 the incidence of diabetes mellitus and cataracts was 5.2 percent in this series of 793 cases. As mentioned previously the greatest incidence of diabetes and cataracts occurred between the ages of 56 and 70 year old groups. There were 39 cases, of which five suffered ruptured capsule. This gave the same percentage of intracapsular extractions as that of the general series, namely 87.2 percent. The outstanding feature of this series of cases was the visual result in which 46.2 percent showed a vision of 20/40 or worse. As can be seen from the Table there were 18 cases in which the vision was worse than 20/40, but in 16 of the 18 cases the low visual acuity was due to the fact that diabetic retinitis was found to be present postoperatively. The attendant postoperative complications of hemorrhage, uveitis, vitreous loss, prolapsed iris, and glaucoma were not unusual from the general picture of the entire number of cases presented. It may be concluded then, that in the diabetic the most serious complication which affects the visual result is diabetic retinitis.

Of the 793 cases presented 69 cases of myopia of greater than 5 dioptres associated with cataract occurred. Of the 69 cases 11

TABLE 5. DIABETES MELLITUS AND CATARACTS

Number of cases	39	5.2%
Extracapsular Extraction	5	
Percentage of Intracapsular		87.2
Diabetic Retinitis	16	
Vision worse than 20/40 from Retinitis	16	
Vision worse than 20/40	18	46.2
Severe Postoperative Hemorrhage	1	
Postoperative Uveitis	1	
Vitreous Loss	1	
Prolapsed Iris	1	
Glaucoma	1	

TABLE 6. HIGH MYOPIA AND CATARACTS

Number of cases	69	%
Extracapsular Extraction	11	
Percentage of Intracapsular		84
Vitreous Loss	4	5.8
Choroiditis accounting for worse than 20/40 vision	10	14.5
Myopic Choroiditis	18	26.1
Vision worse than 20/40	14	20.3
Postoperative Retinal Detachment	2	
Severe Postoperative Hemorrhage	0	
Postoperative Uveitis	0	
Prolapsed Iris	1	

cases of ruptured capsule occurred giving a percentage of intracapsular operation of 84 percent. The vitreous loss was 5.8 percent, and while occurring in an increased percentage over the general series of cases, the incidence was not serious. In the 69 cases of high myopia 18 cases of myopic choroiditis occurred, or 26 percent. It was found that in 10 cases myopic choroiditis accounted for a vision which resulted in less than 20/40. As can be seen the greatest cause of poor visual results was the presence postoperatively of myopic choroiditis.

In other words, in cases of high myopia, excluding the presence of choroiditis, one might expect the same visual results as those encountered in an uncomplicated cataract. Two cases of retinal detachment occurred which does seem to indicate a higher incidence of this complication in high myopia associated with cataract than in other cataracts, but the number of cases perhaps, prevents too definite conclusions being drawn.

Table 7 Analysis of Cataract Extractions Complicated by Old Uveal Infections

Number of cases	19	%
Extracapsular Extractions	5	26.3
Vitreous Loss	0	
Severe Postoperative Hemorrhage	0	
Postoperative Glaucoma	0	
Postoperative Uveitis	0	
Old Retinal and Choroidal Pathology Present which reduced vision to less than 20/40	11	
Number of cases with resulting vision worse than 20/40	11	

Nineteen cases of cataract complicated by old uveal infection occurred. In all these cases posterior synechiae of moderate or severe degree were present. As can be seen from Table 7 26.3 percent of these operations resulted in extracapsular cataract extraction. In some of these cases it was found that the capsule was so adherent to the iris that the posterior synechiae could not be broken down. In most cases, however, it was possible to break down the posterior synechiae prior to cataract extraction following iridectomy by passing an iris repositor between the iris and lens. It is interesting to note that of the 19 cases there were no cases of vitreous loss. It was found that in those cases in which it was possible to break down the posterior synechiae, that the lens delivered with greater ease than that encountered in the normal uncomplicated cataract extraction.

It is interesting to note from Table 7 that no cases of postoperative severe hemorrhage glaucoma, or uveitis occurred. The visual results on the surface appear to be disappointing. Eleven cases of the 19 had a resulting vision of less than 20/40. In all cases the visual result was dependent upon the preexisting pathology, mainly the presence of old choroiditis in the fundus. While by normal comparison the visual results of this series of cases appear disappointing, most of the patients were most happy to obtain even the vision of 20/200 where previously they had light perception. From this series of cases one may conclude that a relatively high percentage of cataracts can be removed in capsule without fear of operative or postoperative complications.

There were 26 cases of cataracts occurring with preexisting glaucoma. All cases had previously been operated on successfully by some glaucoma operation. Of the 26 cases five cases suffered ruptured capsule, or 19.2 percent. Vitreous loss occurred in two cases or 7.7 percent. The small number of cases prevents any particular conclusion regarding this complication. However, in 10 cases out of the 11, it was found that the visual field losses accounted for the poor vision. The occurrence of other operative and postoperative complications was not unusual except in the case of postoperative hemorrhage. There were three cases of severe postoperative hemorrhage, or 11.6 percent. This might be attributed to the frequent cardiovascular pathology seen with glaucoma, such as arteriosclerosis and high blood pressure. Two of these cases were vitreous hemorrhages which recovered with normal vision several months postoperatively.

There were 531 cases of uncomplicated cataracts which were removed intracapsularly. Table 9 illustrates the results of these operations. As one would expect, this group of cases shows the most successful results. The vitreous loss of 3.2 percent is minimum. The incidence of postoperative hemorrhage is relatively the same in this group as for the total group of 793 cases. Severe postoperative uveitis is seen to be a rare occurrence, its incidence being 1.1 percent; and this, indeed, is one of the chief advantages of the intracapsular operation because of the low incidence of postoperative uveal inflammations. The occurrence of retinal detachment and glaucoma postoperatively is relatively the same as for the total group of cases of the survey. The visual results show 97 percent of the cases had visions of 20/40 or better. Three cases of the 16 with vision worse than 20/40 were found to have *macular degeneration*.

TABLE 8. ANALYSIS OF CATARACT EXTRACTIONS WITH PREEXISTING GLAUCOMA

Number of cases	26	%
Extracapsular Extractions	5	19.2
Vitreous Loss	2	
Uveitis	1	
Severe Postoperative Hemorrhage	3	11.6
Preexisting glaucomatous field changes accounting for vision worse than 20/40	10	
Resulting vision of worse than 20/40	11	

TABLE 9. ANALYSIS OF UNCOMPLICATED INTRACAPSULAR EXTRACTIONS

Number of Cases	531	%
Vitreous Loss	17	3.2
Severe Postoperative Hemorrhage	7	1.3
Postoperative Uveitis	6	1.1
Postoperative Retinal Detachment	5	.94
Postoperative Glaucoma	1	
Macular Degeneration	3	
Prolapsed Iris	3	
Number of Cases with Resulting Vision Worse than 20/40	16	3

CONCLUSIONS

The Verhoeff Intracapsular Sliding Method of cataract extraction can safely be done on all types of cataract, complicated or otherwise, with a 91 percent chance of obtaining vision better than 20/40 in patients over 40 years of age. The high percentage (87.8 percent of cataracts successfully removed in capsule and the low vitreous loss (3.7 percent) recommend the operation favorably in comparison with statistics of the Tumbling Method and Suction Methods.

The directness of the approach of the cataract extraction, that is the grasping the lens above at the equator, the unobstructed view of the surgeon in seeing the tension of the forceps on the lens, and the motion of dislocation of the lens, and the fact that the lens itself in its delivery blocks the possible avenue of escape of the vitreous, are in the opinion of the writer, the factors which make for such successful results.

It was thought by many surgeons that high myopia was a definite contraindication for intracapsular cataract surgery. Results of this survey do not agree with this idea. The percentage of intracapsular extractions (18 percent) and vitreous loss (5.8 percent) are comparable with the uncomplicated cataract results. The outstanding unfavorable factor in these cases is the presence of myopic choroiditis which materially reduces the successful visual results. It is worth remembering that most of these patients have had their choroiditis for many years prior to the onset of cataract, and they are quite delighted to have their vision restored to its former degree.

Cataracts secondary to old uveal inflammations can usually be extracted intracapsularly (73 7 percent) in spite of posterior synechiae, by breaking down the synechiae with an iris repositor after performing the iridectomy It is commonly found that the lens dislocates more readily than an uncomplicated cataract, presumably due to a weakening of the zonular fibers from the old inflammation From this survey it is apparent that the visual results are mainly dependent on the condition of the choroid and retina from the inflammatory process

The result of cataract surgery on diabetics is particularly *dependent on the presence of* diabetic retinitis One feels however, that surgery is justifiable if the cataract is sufficiently *developed to prevent study of the fundus* In those cases without retinitis the results are similar to those of the uncomplicated cataract

The results of attempted intracapsular operations where the capsule has been ruptured do not compare favorably with the intracapsular operation High vitreous loss (9 4 percent), presumably due to faulty technic at the time of capsule rupturing is one factor which leads to poor results The immaturity of cataracts with ruptured capsules leads to severe uveal inflammation and is the other main cause of unsuccessful operations

While hemorrhage into the anterior chamber is a rather common occurrence from the third to fifth day postoperatively, it slightly *delays the patient's recovery and does not affect* the ultimate visual result These small hemorrhages are spontaneous as a rule and seem to bear no relationship on the postoperative care of the patient It was found that these hemorrhages were of no more frequent occurrence when the patients were allowed out of bed 36 hours after the operation and allowed to see with the unoperated eye This has become standard procedure

Severe postoperative hemorrhages are a serious postoperative complication These hemorrhages involve the vitreous and may result *in the following complications*

(a) A solid blood clot in the anterior chamber with a resulting secondary glaucoma

(b) A gaping of the wound with possible prolapsed iris, possible prolapsed vitreous or secondary infection leading to panopthalmitis

(c) Expulsive hemorrhage with a bursting open of the wound and loss of intraocular contents requiring enucleation

(d) Massive vitreous haemorrhage which may cause a degeneration of the vitreous resulting in retinitis proliferans A few cases, however, recover normal vision after several months

The simple conjunctival suture used in 593 cases has proven adequate It is atraumatic and the statistics compare most favorably with other more complicated sutures

RIASSUNTO

Il metodo intracapsulare, per striscio, di Verhoeff puo' essere eseguito senza pericoli in *ogni forma di cataratta, anche se complicata* Nel 91% dei pazienti oltre i 40 anni esiste la possibilita di ottenere una visione migliore di 20/40 l'elevata percentuale (87,8%) di cataratte estratte con successo nella capsula, unita alla bassa percentuale (3,7%) di perdita del vitreo, depone a favore di questo metodo operativo piuttosto che degli altri metodi per caduta o per suzione

I vantaggi del metodo derivano del fatto che la lente viene afferrata al disopra dell'equatore, consentendo in tal modo una piu' diretta via d'accesso alla cataratta, alla visione piu' perfetta dell'operatore nel seguire la presa del forcipe ed i movimenti di dislocazione della lente stessa, al piu' difficile de*flusso del vitreo, bloccato dalla lente stessa*

Anche le cataratte secondarie a vecchie flogosi dell'uvea possono essere estratte per via *intracapsulare (nel 73,7% dei casi)* nonostante sinechie posteriori in questi casi le aderenze vengono staccate mediante ripositori dell'iride dopo l'iridectomia La lente puo' essere dislocata piu' facilmente in questi casi, probabilmente perche' il processo infiammatorio ha indebolito le fibre zonulari I risultati—per quanto riguarda la visione—dipendono in gran parte dalle condizioni della coroide e della retina Nei diabetici i risultati dipendono specialmente dall'esistenza, o meno, di una retinite Qualora la cataratta e' talmente progredita, da impedire l'esame del *fondo, l'operazione e' comunque giustificabile* Nelle cataratte diabetiche senza retinite, i risultati sono uguali a quelli dei casi non complicati

SUMARIO

La extraccion de cataratas por la tecnica intracapsular de Verhoeff, se puede usar en todos los casos, aun los complicados, con un 91 por ciento de probabilidad de que la vision sea mejor de 20/40, en pacientes de mas de 40 anos de edad. El porcentaje (87,8 por ciento) alto de cataratas en capsula extraidas por este metodo con buenos resultados, mas el porcentaje muy bajo de perdida del humor vitreo (3,7 por ciento) recomiendan a esta operacion con preferencia.

La tecnica de este metodo tiene para el cirujano muchas ventajas; que se han discutido en detalle en este articulo.

Las cataratas que son secundarias a inflamaciones viejas de la uvea, generalmente se pueden extraer por el metodo intracapsular (73,7 por ciento) no obstante la existencia de la sinequia posterior. En estos casos se puede practicar la sinecotomia con un repositor despues de haberse hecho una iridectomia. En los casos complicados es generalmente mas facil la dislocacion del cristalino, que en los casos no complicados; posiblemente esto se debe al debilitamiento de las fibras zonales por la antigua inflamacion. Este estudio hace aparente que los resultudados en general, con respecto a la vision, dependen en particular al estado de la coroides y de la retina. Los resultados de esta clase de cirujia en los diabeticos depende en particular en la presencia de la retinitis diabeticogena. Sin embargo la cirujia en estos casos se justifica siempre y cuando la catarata impida el estudio del fondo ocular. En los casos sin retinitis, los resultados son similares a los que se obtienen en los casos no complicados.

SOMMAIRE

La méthode de glissage de Verhoeff pour l'extraction de la catarate peut être employée dans toutes les variétés de catarates compliquées ou autres. On obtint un pourcentage de 91 pour cent de vision supérieure à 20/40 chez les malades au-dessus de 40 ans. Un haut pourcentage (87,8 pour cent) de catarates enlevées avec succès dans la capsule et une perte minime de l'humeur vitrée (3,7 pour cent) recommandent cette opération qui donne des résultats favorables en comparaison avec les statistiques de la méthode Tumbling et des méthodes de suction.

Pour l'extraction de la catarate, on saisit la lentille au-dessus de son equâteur Le chirurgien ainsi voit mieux la tension du forceps sur la lentille et le mouvement de la dislocation de la lentille. Dans cette méthode, la lentille empèche l'écoulement de l'humeur vitrée. C'est l'opinion de l'auteur, que ces facteurs font que cette opération donne de si bons résultats.

Les catarates secondaires à d'anciennes inflammations uvéales peuvent généralement être extraites intracapsulairement (73,7 pour cent) même s'il y a des adhérences. On brise ces adhérences avec un repositeur de l'iris après avoir fait l'iridectomie. Généralement, la lentille se detâche plus facilement que dans les cas de catarates non compliqueés, probablement cela est dû à l'affaiblissement par l'inflammation des fibres annulaires. Apparemment, les résultats visuels obtenus dépendent en grande partie sur l'état de la choroïde et de la rétine. Les résultats de la chirurgie des catarates sur les diabétiques, sont influencés par la présence ou l'absence de rétinite diabétique. Neánmoins, l'intervention chirurgicale est justifiée si la catarate a atteint un degré qui ne permet pas l'étude du fond de l'oeil. Dans les cas sans rétinite, les résultats sont les mêmes que dans les cas de catarates non compliquées.

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Case Report

Metastatic Carcinoma of Left Lobe of Liver—Hepatolobectomy

C W BURNS, M D, F R C S (C), F A C S, F I C S
WINNIPEG, CANADA

IF ONE were to eliminate splenomegaly, the occurrence of large solid tissue tumors of the left upper abdomen would be comparatively rare

The case history of a female patient who, in March 1944, had a radical mastectomy for advanced carcinoma of the right breast, is discussed in this paper She had quite a long interval (over three years) of apparent freedom from her disease In November 1947 she returned because of distressing symptoms due to a large left upper abdominal tumor The tumor proved to be a metastatic carcinoma of the left lobe of the liver A left hepatolobectomy was done in December 1947 Up to the date of this recording, a period of 15 postoperative months, she has remained symptom free and in the interval has been able to carry on with her ordinary duties as a farm housewife

This case presents a number of unusual features, sufficiently rare, to justify recording

It is fortunate that on both occasions I had the opportunity of attending this patient, even though in each instance it was for advanced carcinoma The second time it was for metastasis of a breast carcinoma in a most unusual and exclusive site Both operations were done at the Winnipeg General hospital The advantage from the standpoint of this record is obvious A continuity of events was established from 1944 to 1949 which has permitted an accurate study from our own records of the clinical, radiographical and the pathological details in connection with the course of the disease in this case The pathological record is most important

CASE HISTORY

Female, age 58 The patient was first referred to me in March 1944 because of a breast tumor which was obviously carcinoma with advanced manifestations She was a small type of person, underweight but active and wiry Her general health was not materially undermined by the presence of this lesion in spite of the fact that the "lump" had, to her knowledge, been present for over two years

With reference to the local findings my notes at this time were as follows "A stony hard tumor in the right breast, upper and lateral quadrant, situated near the nipple The tumor is at least 3 cms in diameter The overlying skin is adherent to the mass below The breast is not fixed posteriorly There are palpable nodes in the axilla Diagnosis Advanced carcinoma of the breast with axillary lymph node involvement "

An x ray of the lungs was negative Nothing of unusual significance was found in the general clinical examination at this time

On March 6, 1944 a right radical mastectomy was done The patient made an uneventful recovery

Pathological report Breast of right radical mastectomy

Report · Specimen consists of tissue removed at right radical mastectomy including breast pectoral muscles and axillary contents The overlying skin ellipse covering the medium sized breast measures 15x6 cms Located near and deep to the nipple within the breast tissue is a fairly freely moveable tumor measuring 3 cms in diameter Tumor is fairly well circumscribed, non encapsulated Cut surface is pale, moderately firm except for a central area of haemorrhagic bulging Of the lymph nodes found in the axillary contents one is replaced by tumor

Micro. Infiltrating mammary carcinoma showing a variety of cell types and patterns There are areas of typical infiltrating duct carcinoma grade three, with fairly well circumscribed areas of so called bulky mammary type of carcinoma showing some adenocarcinomatous features The metastasis to the lymph node is of the infiltrating duct carcinoma pattern

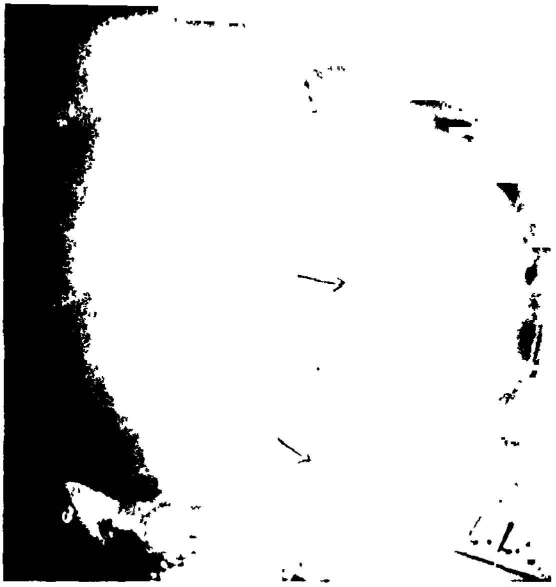


Fig. 1. Lateral view. Nov. 12, 1947, showing entrinsic tumor pressure on stomach.

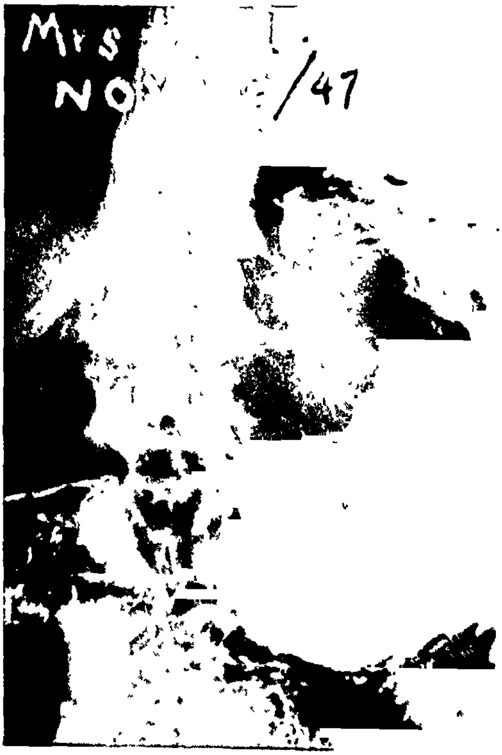


Fig. 2. A.P. view, preoperation.

The patient returned to her home in a rural district with instructions to report to her local physician at regular intervals. She failed to do so until symptoms, at first vague but later most obvious, became so distressing that medical attention was demanded.

On Nov. 10, 1947, three years and eight months following the operation for carcinoma of the breast, Mrs. T. was again referred to me. This time it was because of a large tumor in the left upper abdomen, which had reached proportions sufficiently great to create persistent and distressing gastric symptoms. Some weeks previously she had consulted her physician because of substernal distress which at this time I understand was thought to be cardiac in origin. These symptoms were soon followed by more localized manifestations described as a heavy sensation and a feeling of fullness in the epigastrium, belching, anorexia, weakness and loss of weight. Skirt bands became uncomfortable and tight. Eventually the patient discovered the "lump" in her abdomen. This discovery naturally alarmed her greatly. She reported to her local physician who advised her of the suspected nature of the tumor and recommended she return to Winnipeg for further advice.

Examination: The patient was obviously worried and distressed, otherwise her general appearance had not changed materially. She had lost weight but did not present the clinical picture of one suffering from a generalized carcinomatosis. There was no evidence of local or regional recurrence at the site of her mastectomy performed over three and one-half years previously. Lymph nodes in the neck, etc. were normal. No edema was present in the arm. The axilla was negative. There was no cough. I was unable to determine any clinical evidence of metastasis to the spine or other bony structures.

Abdomen: On inspection the bulging of a large mass in the left upper quadrant was apparent. The skin appeared to be tense, but otherwise normal. There was no evidence of dilated veins, or superficial varicosities of the abdominal wall. There was no jaundice.

On palpation the mass was firm. It felt smooth rather than nodular. Its upper border could not be determined because of the overlying ribs. It extended from beneath the ribs inferiorly to about the level of the umbilicus The mass occupied practically the entire left upper quadrant The lower palpable portion could be readily outlined and it permitted a reasonable degree of mobility from side to side It did not present the characteristics of an enlarged spleen but favored those of a liver tumor There was no palpable enlargement of the right hepatic lobe, no demonstrable ascites and as stated above no evidence of jaundice

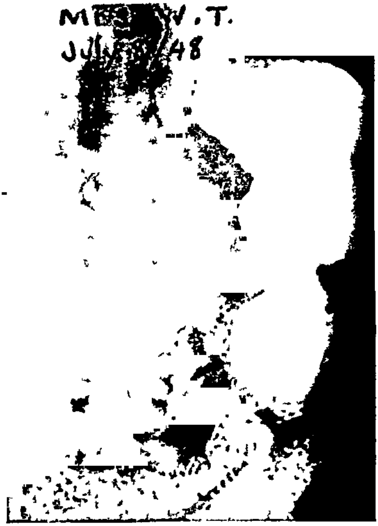


Fig 3 A P view, postoperative view

A tentative diagnosis of a neoplastic tumor involving essentially the left lobe of the liver was made It was assumed that this tumor was of metastatic origin It appeared to be of a solitary nature involving a site of unusual selection to a prominent degree We were puzzled about the apparent absence of metastasis to common sites elsewhere and were likewise unable to explain any mode of tumor spread which perchance could locate in the left lobe to the apparent exclusion of the right and the more natural site for demonstrable metastasis to occur It seemed highly improbable that the right lobe could escape in spite of the impression one received from the clinical investigation The explanation of this preference for gross implantation remained an unsolved problem

Laboratory Tests

R B C's	4,400,000
H G	78%
C I	0 9
Morph	Approximately normal
W B C's	4,000
Sed Rate	23 mm in 1 hr in the 200 mm tube
Urinalysis	negative

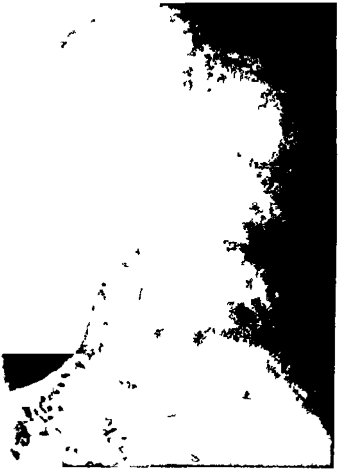
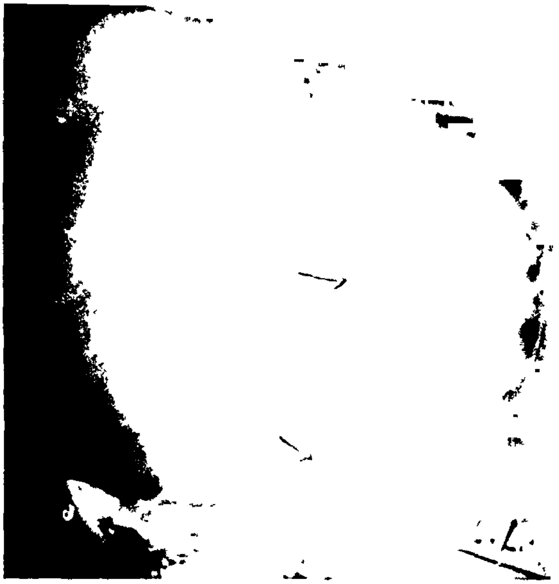


Fig 4 July 8, 1948, eight months after operation

X ray Examinations. Lungs negative Flat plate of abdomen showed a large soft tissue mass occupying the left upper quadrant X-ray after ingestion of a barium meal "The stomach and duodenum shows no radiographic evidence of intrinsic lesion The soft tissue



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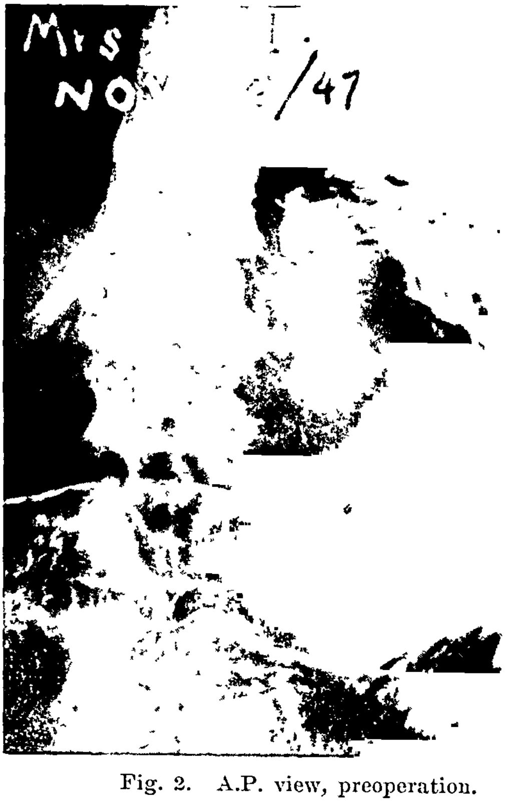

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On palpation the mass was firm. It felt smooth rather than nodular. Its upper border could not be determined because of the overlying ribs. It extended from beneath the ribs plastic invasion The left lobe contained several large areas of apparent invasion The central portions of these lesions were soft due perhaps to a central necrosis It was adherent on its undersurface to the gastrohepatic omentum Separation was accomplished chiefly by blunt dissection A biopsy confirmed the diagnosis of carcinoma After releasing the left lobe it could be delivered well forward, thereby facilitating the operative procedure

The entire left lobe was transected at the line of the falciform ligament Bleeding was controlled in part by forceps and in part by manual compression Hemostatic mattress sutures of ribbon catgut were inserted as the line of incision progressed We were able to secure a few of the larger vessels by transfixed ligatures Hemostatic oxycel gauze was employed and fixed to those areas which continued to ooze after the mattress sutures were tied This procedure satisfactorily controlled hemorrhage At the conclusion of the transection the field was free from bleeding of any significance Blood transfusion during the operation replaced fairly adequately the blood lost

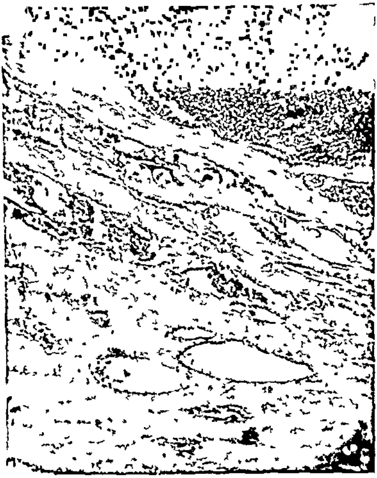

Fig 6 Liver tumor X15 (Surg Path No 5565/47) showing from above downward (a) papillary adenocarcinoma similar to Fig 5, (b) dilated portal veins in false capsule, (c) flattened liver lobules

The patient's condition remained remarkably good throughout

Pathological Report Specimen consists of the entire left lobe of liver

Report Specimen contains an ovoid mass of tumor 14x11x10 cms On one surface is an ellipse of liver tissue 11x8 cms and measuring 0 5x2 5 cms in thickness Remainder of the surface consists of a smooth capsule with a few adhesions On the surface opposite to the liver tissue are three protruding nodules 1 to 2 cms in diameter Capsule over these is intact

On cut section capsule measures 0 1 cms in thickness Liver tissue is compressed The tumor is variegated in appearance, is cellular, soft, pinkish, friable with a few yellow areas of necrosis

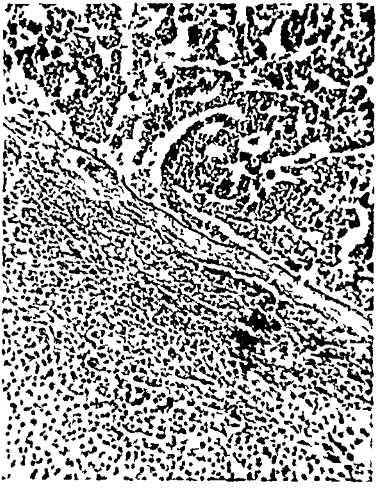

Fig 7 Liver tumor X100 (Surg Path No 5565/47) Papillary adenocarcinoma above similar to Fig 5 This tumor is within a distended portal vein Liver parenchyma below

Micro: Metastatic mammary carcinoma. Histology is similar to previous right breast tumor. This breast tumor is growing as two distinct cell types; a duct carcinoma and an adenocarcinoma. The duct type of carcinoma metastasized to the regional lymph nodes and it is the adenocarcinoma type which has metastasized to the liver.

The patient made an uneventful recovery. She was discharged from the hospital Jan. 17, 1948. She soon regained the recent weight loss and has to the time of this recording continued to do well.

The removal of this tumor mass promptly relieved the pressure symptoms but it was the psychological effect on the patient that was most pronounced. Her whole attitude was changed from one of depression and hopelessness. On the occasion of her first visit to the office this complete change of attitude was so evident that it was noticed and remarked upon by the office staff. The surgical operative wound healed by first intention and Mrs. T. returned to her home in the country and has been able to continue with her ordinary household duties as a farm housewife.

In July 1948 at our request she returned for examination. We found her very well. Physical examination was negative.

Barium meal—reported as follows: Marked change. Stomach no longer displaced as it was in November 1947.

Blood Exam.: July 7/48—

H.G.	78%
R.B.C.'s	4,090,000
C.I.	0.96
Morph.	Approx. normal
Sed. Rate	22 mm. in 1 hr.

I had written to Mrs. T. and asked that she return for examination immediately prior to the writing of this report. She replied she would be unable to come for perhaps two months but stated she was feeling very well and had no complaints except that she recently suffered for a short period from constipation.

In any event, the 15 month interval free from symptoms has been unique and has made us feel that the operation was quite worthwhile in spite of the fact that we could not entertain an optimistic view for her future.

The dissemination or mode of spread of malignant tumor cells in the body frequently follows a common pattern emanating from any given site. There are, however, many exceptions. The case reported is a striking example of the exceptional. Not infrequently the primary tumor remains hidden and insignificant without creating disturbing symptoms until tumor cells, which have migrated from the original lesion, have become lodged in fertile soil have produced a secondary tumor of greater magnitude.

The location of the secondary growths is very important from the standpoint of diagnosis and treatment. Not infrequently it is for the relief of symptoms referrible to the secondary lesion that the patient seeks advice.

FOLLOW-UP REPORT

Following excision of the left lobe of the liver for metastatic breast cancer this patient remained well and active, sign and symptom-free for 15 months. She returned to the city for delayed follow-up examination in April. At this time her only complaint was that of a recent constipation.

Examination showed no sign of recurrence at the site of the right radical mastectomy (March 6, 1944) or in the upper abdomen (left hepato-lobectomy Dec. 30, 1947). Her hemoglobin was 77 percent compared to 87 percent in July 1948, seven months previously. Sedimentation rate was normal, and she had gained weight since her last operation. In the lower abdomen a poorly defined supra-pubic mass was found. On rectal examination it felt like an extrinsic mass encroaching on the rectal lumen. This was confirmed by a barium enema.

She was admitted to the hospital and a laparotomy was done, April 16, 1949. There was bloody fluid in the peritoneal cavity. A large metastatic omental tumor was present in the pelvis and attached below to the right broad ligament, where a left ovarian cyst was buried, which was compressing the sigmoid and rectum. The right lobe of the liver was studded with metastatic nodules. The site of the previous left hepatolobectomy was healed.

Convalescence was rapid and her wound healed quickly. She had been temporarily relieved of her constipation.

This lady continues to be well and active. She shows few constitutional ill effects of her now extensive metastases. It is five years and two months since the radical mastectomy for the three stage cancer and 18 months since the hepato lobectomy. The recent laparotomy findings were not at all surprising and the prognosis is obvious but I believe that the complete history is interesting and in spite of the unfavorable end result, the outlined procedures have been worthwhile.

SUMMARY

The commonest sites in the body for the harboring and growth of migratory tumor cells are the liver and the lungs. From 30 to 50 percent of all fatalities from carcinoma secondary lesions are to be found in the liver. This is due in part to the high fertility of liver tissue for tumor cell growth and in part to the histological and anatomical features of this organ. It is not surprising to find that the incidence of blood borne metastasis in the liver is high for all primary tumors arising in tissues which are connected with the portal area, but it is indeed amazing to realize that in a case of primary carcinoma of the breast we have been able to report an instance of definite metastasis to the liver where the secondary lesions had so exclusively selected the left lobe that at the time of operation we were unable to find evidence of metastasis in the right. The left lobectomy has given this patient freedom from symptoms and distress for a period much longer than we had anticipated.

RIASSUNTO

Le sedi piu' comuni delle metastasi carcinomatose sono i polmoni ed il fegato. La speciale fertilita' del tessuto epatico e le caratteristiche anatomiche del fegato spiegano il perche' nel 30—50% dei casi questo diventi sede di una metastasi. E' facile spiegare questa singolare frequenza allorquando la dispersione delle cellule neoplastiche origini da tumori connessi con la circolazione portale ma e' sorprendente come il fenomeno si ripeta anche in casi nei quali la sede primitiva del tumore e' assai distante dalla circolazione epatica.

L'A riporta per esempio un cancro primitivo della mammella il quale si era riprodotto —al momento dell'operazione—solamente nel lobo sinistro del fegato. L'asportazione di questo lobo ha evitato per un lungo periodo di tempo la comparsa di ulteriori manifestazioni patologiche.

SUMARIO

El higado y el pulmon son los organos que mas comunmente sufren de lesiones metastaticas cancerosas. De 30 a 50 por ciento de los casos de cancer que terminan fatalmente presentan metastases en el higado. Esto se debe en parte a la gran fertilidad del higado para los tumores cancerosos y tambien a su anatomia y histologia. Por lo tanto no sorprende el encontrar una alta proporcion de metastases en el higado en casos de canceres primarios en organos cuya circulacion connecta con la circulacion portal. Sin embargo es sorprendente el encontrar metastases en el lobo izquierdo del higado en un caso nuestro de cancer primario de la mamma. En esta coso no encontramos evidencia de invasion del lobo derecho de este organo. La lobectomia del lobo izquierdo del higado ha dado a este paciente un periodo libre de todo sintoma, mucho mayor de lo que nosotros habiamos anticipado.

SOMMAIRE

Les metastases des tumeurs sont plus frequentes dans le foie et dans les poumons. Trente à 50 pour cent de toutes les fatalités de lésions secondaires du carcinome siegent au foie. Ceci est en partie dû a ce que le tissu hépatique possède une grande fertilité pour la cellule neoplasique et en partie aux caractères histologiques et anatomiques de ces organes. Il n'est pas etonnant que les metastases du foie par voie sanguine de tumeurs en rapport avec la région portale soient élevées. Mais il est etonnant de trouver dans un cas de carcinome primaire du sein que nous avons pu faire le rapport d'une metastase au foie. Le région secondaire était exclusivement présente dans le lobe gauche. A l'opération, nous n'avons trouvé aucun signe de métastase dans le lobe droit. Une lobectomie gauche donna a notre malade une période sans symptomes beaucoup plus longue qu'on aurait crue.

Ambidexterity in Surgery

A STUDY of the existence of handedness in plant and lower animal life, and even in the mineral kingdom, may seem to bear little relation to surgical technic, but the fact remains that many important and interesting points may be gained therefrom. The predominance of right over left or left over right is far more prevalent in all nature than is generally supposed. Handedness is inherent in certain crystals and solutions which rotate the plane of polarized light to the right or to the left. It appears in seashells, most of which are, so to speak, right-handed.

There is an extant moss of carboniferous type whose helical curves are directed invariably to the right. Convolvulus and the runner bean twine in the same direction as a corkscrew; honeysuckle and the hop vine twine the other way. Among fish, the flounder lies on the opposite side from that favored by the halibut. The lobster, which, as Charles Kingsley has reminded us, is more curious than anything all the scientists in the world could possibly invent, has one large claw resembling a forceps and a smaller chela resembling scissors. With exceptions, the males tend to be right-handed and the females left-handed.

In the course of evolution, man—unlike most animals with two occipital condyles—has kept the power of supinating the hands and opposing the thumbs. The human foot has forfeited its arboreal grasping powers in the process of conforming to the erect posture. Among anthropoid apes, handedness is less consistent than in man.

Drawings of the Stone Age man usually show him clutching his weapons in the right hand. Today, all but about six percent of us are right-handed. Most of those who claim to be truly ambidextrous are probably left-handed by birth and right-handed by education. Neglect of one hand produces a disability comparable with amblyopia ex anopsia.

It is to be noted that reflections or photographs of the hands show no perceptible difference between the left and the right. This suggests strongly that an equal, or approximately equal, skill in the use of them is within our reach. One hand may act as vanguard, but the other should be ready to take the initiative when required. An injury to the right shoulder is said to account for the celestial left-hand parts of the music of Scriabin. The polyphonic harmonies of Bach are the apotheosis of combined and independent action of the musician's two hands.

What has all this to do with surgery? A very great deal, since the development of some degree of ambidexterity will enable the surgeon to operate more smoothly, more delicately, more rapidly and more rhythmically than he can operate without it. Ambidexterity is almost essential in direct ophthalmoscopy, and in many difficult and delicate operations on the eye it is most valuable both to the surgeon's success and the patient's safety. In a perfect incision for cataract there is no handedness, although puncture and counterpuncture and the inclination of the knife must be accurate within very fine limits. This kind of skill is well within the capacity of either hand. Tumbling the lens in intracapsular extraction, however, is an advanced form of dissection to be entrusted only to the master hand.

In the transfrontal approach to orbital tumors, it is usually the assistant who retracts the patient's dura mater and brain; but a surgeon confident in his ambidexterity can remove a pituitary tumor from the side corresponding to the patient's blinder eye, at the same time retracting the brain with the other hand.

For the dissection of tonsils, ambidexterity is a sine qua non. One of my most treasured instruments is an eyed needle for this operation as used by Nager of Zurich. It is tempered like a rapier and curved axially, so that it can be used for a rotary motion with either hand.

In any formula for skill, time must be included in the denominator. As Dessault has truly said, the simplicity of an operation is the measure of its perfection An excellent example of what ambidexterity can do to simplify a surgical procedure may be seen in tonsillectomy with the guillotine By the aid of ambidexterity combined with rhythm, it is possible without slurring to accelerate from andante to allegro con brio, and turn the patient face downwards, after only three encircling movements for each tonsil as follows (1) the left hand, grasping the guillotine, is fully pronated, elevating the patient's tongue From this position the hand is supinated through ninety degrees and abducted drawing the right tonsil up into the mouth The thumb of the right hand extroverts the tonsil, while (2) the left hand is supinated further *until the tongue escapes medially* This minimizes the risk of postoperative hemorrhage The blade is closed firmly, and (3) the left hand is again fully pronated Mainly with the thumb of the right hand the guillotine is pushed axially toward the opposite pyriform fossa thus enucleating the tonsil

Elegance is the secret of success in plastic surgery In operations for harelip and cleft palate ambidextrous insertion of sutures doubly armed with fully curved needles, the gap between the eye and the point being three eighths of a circle brings broad surfaces into apposition and prevents curling in of the edges without damaging the vitality of the tissues Thus elegance turns a major operation into a minor one and elegance is best achieved with the help of ambidexterity

I have recently had a striking personal experience of the value of observing handedness wherever it appears A child age 22 months was presented for examination and proved to have a partially coiled piece of rigid steel wire caught in the throat The uncoiled upper end of the wire could be freed from the left wall of the pharynx but its lower end was curled upward and backward into the prevertebral pharyngeal mucosa It was so firm and rigid that it seemed impossible to remove it without tearing the tiny throat and it was too strong to be cut with any available tool without perforating the mucosa The position of the top end made it impossible to get the lower end into the lumen of the endoscope Realizing that the partially uncoiled wire formed part of a left handed spiral, I changed the forceps to my left hand and, using a more confident left-handed rotation, got it free

Not only surgery but bacteriology has something to learn from this neglected sphere of knowledge According to Pijper, motile bacteria are not rods but helices, and each flagellum is nothing more than a coil of mucoid threads The gyrations of the bacteria which propel them with ease, become visible when the motion is retarded in a viscid cellulose medium Three dimensional microscopy may tell us why some patients have one form of a *disease and others another*, a given microorganism not having been distinguished from its mirror image, etc Treponema pallidum is coiled with the precision of a lamp filament and with a pitch of one micron In studying it, one must remember that a corkscrew, if looked at through a telescope or a microscope, is still apparently right handed, but its mirror image is left handed Such niceties of observation may bring about unexpectedly significant discoveries

To apply this hypothesis to the study of microorganisms is to point the way to new advances To apply it to surgery is merely to give ear to those who, all down the ages, have enjoined the best possible use of both the right hand and the left

Surgery demands more than natural aptitude correct training and constant practice, the mind and soul must expand as well Reason is the bridge by which we may cross over into new fields of surgical experience It is possible not only to submit to evolution but to cooperate with it Speaking from the evolutionary point of view, total decussation of the optic tracts was long ago relinquished in the interests of binocular vision Similarly, total predominance of one hand over the other should be deliberately amended for the sake of that simple skill which is the true goal of every surgeon

W O Lodge

News Notes

Congress of Obstetrics and Gynecology

The 12th British Congress of Obstetrics and Gynaecology convened at Friends Meeting House, Euston Road, London, N.W. 1 on July 6-8 with Sir Eardley Holland presiding. Some of the subjects for discussion were "Modern Cesarean Section" "The Management of Pregnancy in Diabetics"; "Precancerous Cellular Changes in Carcinoma of the Cervix," and "The Operation of Pelvic Exenteration."

International European Society of Hematology

This society is holding a meeting in Montreaux, Switzerland, Sept. 15, 16, and 17, 1949. Hemolytic anemias, and changes in the blood-proteins in blood dyscrasias, have been proposed as subjects for the main discussion. Further information may be had from Dr. A. Piney, 152 Harley Street, London. W. 1.

Tuberculosis Control in Europe

The United Nations International Children's Emergency Fund anti-tuberculosis vaccination program has inaugurated the largest mass immunization ever undertaken. The program contemplates tuberculin-testing 40 to 50 million children in Europe and offers vaccination to all found to be uninfected by the tubercle bacillus. A total of $4,000,000 has already been allocated by the Children's Fund for the work, and the testing and vaccination of European children will begin very shortly under the joint sponsorship of UNICEF, the World Health Organization, the Danish Red Cross, and other Scandinavian Red Cross chapters. After completion of the European project, similar programs may be undertaken in Algeria, Tunisia, Morocco, and China as well as Southeast Asia and Latin America.

Russian Discoveries

The State Medical Library in Moscow, claimed to be the largest of its kind in Europe, is holding an exhibition of medical literature according to a Moscow Radio report. The main section, called "The Superiority of Russian Medicine," discloses several Russian medical discoveries. For example, one book deals with the life of Nikolai Pirogov, the eminent Russian surgeon of the last century. It claims he was the first man to use ether as an anesthetic, in 1847. In the West, the American dentist Morton is generally recognized as the first to have used it, in 1846. Pirogov was also named as the inventor of the plaster cast for fractures and the father of modern field surgery, according to this same report. The report also claims that the discovery of insulin in the treatment of diabetes was not made by Sir Frederick Banting but by Professor Soboley, a Russian scientist.

Fire Destroys Chilean Medical School

The School of Medicine of the University of Chile was recently destroyed by fire. The library which had about 50,000 volumes was almost completely destroyed. It had just recently been reorganized by Edward Heiliger of the Rockefeller Foundation. The bibliographic material in the Institute of Biology and Institute of Microbiology was completely lost. Some of the books and journals needed to rebuild the Chilean library will be supplied by the U. S. Army Medical Library from duplicate stock.

Rio de Janeiro Tuberculosis Law

The President of the Republic promulgates the following law concerning the distribution of vaccine.

The Minister of Education and Health has the authorized executive power concerning the national service of T. B. to remove anyone in the national territory or to vaccinate them. The national service of T. B. realizes the difficulty to enforce this so authority is extended to the governors of the States. Within two years it will be asked that everyone have a certificate of vaccination showing birth, hospital service, occupation and armed service.

The executive power is given likewise to other foundations in order to aid them in their scientific and technical control of these diseases. In order to carry through this law, the executive power will open a special credit of three million dollars.

Medical Grants Distributed

Institutions in 30 states have been given grants totaling $2,040,000 to finance medical and other research projects, according to a recent release through the Associated Press.

International Congress on Rheumatic Diseases

The Seventh International Congress on Rheumatic Diseases was held in New York City, May 30-June 3, 1949, under the sponsorship of the International League against Rheumatism. The host was the American Rheumatism Association, assisted by the New York Rheumatism Association. The Congress was the first International Congress on Rheumatic Diseases to be held in the United States

Fifth International Congress of Surgeons—La Paz, Bolivia

Under the auspices of the government of the nation, and organized by the Society of Surgeons of La Paz, the Fifth International American Congress of Surgeons will take place between Oct 17 and 21, 1949

The Congress will be celebrated at the same time as the Fourth Centennial of the City of La Paz and those who participate can take part in these activities

Dr Filiberto Oviedo Radas is corresponding secretary and Dr Enrique Berrios is secretary general.

Twenty-First Anniversary Year of Harofe Haivri

With the appearance of Volume II, 1948, The Hebrew Medical Journal, edited by Moses Einhorn, M D, concludes its 21st successful year of publication.

In publishing the Journal, the editors aim to meet the need for a medical journal written in Hebrew, with English summaries, thus aiding greatly in the advancement and development of Hebrew medical literature The Editorial Office of The Hebrew Medical Journal is 983 Park Ave. New York 28

Meeting Announced for the Ambulatory Fracture Association

The tenth annual meeting of the Ambulatory Fracture Association will be held in Toronto, Canada, Oct. 24 to 27, 1949, for the study of skeletal pinning and external fixation. The program will include the various skeletal fixation technics, intramedulary pinning, and hip-nailing Those persons interested are asked to contact: Dr Curtis Lee Hall, president

Survey of Allergy-Producing Molds

The research council of the American Academy of Allergy is conducting an international survey of allergy-producing molds to determine in which areas hay fever-producing molds are most concentrated and where least prevalent. The extensive study will involve the cooperation of about fifty allergists and bacteriologists in forty states, Canada and Mexico.

Dr. Woo Elected to F.R.C.S.

Dr Arthur Wai-Tak Woo, F.I.C.S., Hong Kong, has been accorded the distinction of being the first Chinese to be elected to Fellowship in the Royal College of Surgeons of England.

Argentine Congress of Radiology

The first annual meeting of the Asociacion Argentina de Radiologia was held in July 1949 in Santiago del Estero, Argentina. Dr. Sabino di Rienzo, Cordoba, whose work on "Radiological Aspects of Bronchial Dynamism" won first prize at the meeting of the Radiological Society of North America, is President of the Association.

University Hospital Havana Offers New Publication

The University Hospital of Havana inaugurated a new publication called *The Archives of the University Hospital.* The first number January-February issue contained excellent articles on hepatic changes in pellagra, temporal arteritis, and rheumatic carditis

U. S. Specialists to Review Tropical-Disease Control

The Economic Cooperation Administration mission to the United Kingdom has announced that Dr. Frederick J. Brady, U. S. Public Health Service, and Harry H. Stage, U. S Department of Agriculture, are to visit British territories in East and West Africa to survey conditions affecting the control of trypanosomiasis and malaria, and to make recommendations for further U S assistance in combating the tsetse fly and mosquitoes The project has been arranged under E.C.A.'s technical assistance program.

Streptomycin for Europe

During its first year the United States Economic Cooperation Administration has financed the purchase of nearly nine million dollars worth of streptomycin for nations participating in the European Recovery Program. France is now receiving about 500 kg. a month, while the Netherlands is receiving about 41 kg. a month; shipments have also been sent to Italy, Austria, and Greece. E.C.A. is financing more than $500,000 worth of American equipment so that two French plants near Paris may produce streptomycin.

Newly Elected Officers of the Peruvian Academy of Surgery

Newly elected officers of the Peruvian Academy of Surgery: Dr. Cesar Heraud, president, Dr. Oscar Guzman del Villar, 1st vice president, Dr.

Amader Merino Reyna, 2nd vice president; Dr. Jorge de Romana, secretary general; Dr. Alfredo D. Curette, recording secretary; Dr. Aurelio Diaz Ufano, secretary of scientific functions; Dr. Luis M. Delgade, treasurer; Dr. Ernest Raffo, librarian; Dr. Alejandro Higginson, director of publications; Dr. Alberto Teranzo, Dr. Felipe A. de La Terre, Dr. Juan S. Lesne, Dr. Rolando Colareta, and Dr. Marces Nicolini, comprise the board of trustees.

Philippine Radiological Society

The Philippine Radiological Society was organized in Manila, Aug. 14, 1948 with the following officers elected: President, Dr. Paterno S. Chikiamco, president; Dr. Daniel Ledesma, vice president; Dr. Ramon Paterno, secretary-treasurer; Dr. Paulino Garcia, Carlos Marquez and Hilario Zialcita, councilors. The primary aim of the society is to promote and safeguard the highest standards of radiology and to put the science in its proper evaluation, thus safeguarding also the interest of the patients in particular and the public in general.

The Unesco Courier

The Unesco Courier, a monthly newspaper which is published in Paris and which reports global activities of the Organization, will soon be available to U. S. readers on a subscription basis. Orders may be placed with the Columbia University Press, New York City 27.

The Elizabeth Blackwell Centennial

In recognition of the contributions made by the women doctors of the world to the science, practice, and teaching of medicine, Hobart and William Smith Colleges in Geneva, New York, cited twelve leading women doctors of the United States, Canada, England and France on the 100th anniversary of the graduation of Elizabeth Blackwell, first woman doctor.

These women doctors honored were: Dr. Florence R. Sabin, Denver, Colo., Dr. Alice Hamilton, Hadlyme, Conn., Dr. Helen B. Taussig, Baltimore, Md., Dr. Martha May Eliot, Washington, D. C., Dr. Gerty T. Cori, Webster Groves, Mo., Dr. Priscilla White, Boston, Mass., Dr. Helen V. McLean, Chicago, Ill., Dr. Margaret C. Craighill, Topeka, Kans., Dr. Helen MacMurchy, C.B.E., Toronto, Canada, Dr. Elise S. L'Esperance, New York, Dr. Helen M. M. Mackay, F.R.C.P., London, England, and Dr. Therese Bertrand Fontaine, Paris, France, first French woman medecin des hopitaux.

Sixth International Congress of Radiology

The sixth International Congress of Radiology will be held in London during the summer of 1950. Dr. Ralston Paterson is president of the Congress and Dr. H. Graham Hodgson is treasurer with Dr. J. W. Mclaren as secretary-general.

Complete details of the Congress will be sent to each radiologist and published as soon as possible. An office has been established for the Congress at 45 Lincoln's Inn Fields, London, W.C.2, and all correspondence should be sent to that address.

American Congress on Obstetrics and Gynecology

The International and Fourth American Congress on Obstetrics and Gynecology will be held May 14 to 19, 1950, at the Hotel Statler, New York City. It is sponsored by the American Committee on Maternal Welfare. General sessions will be held to discuss the following topics: (1) Physiology of Human Reproduction; (2) Pathology of Human Reproduction; (3) Social and Economic Problems; (4) Neoplastic Diseases of the Female Reproductive System; (5) Obstetric and Gynecological Procedures. Information may be obtained from Dr. Fred L. Adaire, 24 W. Ohio St., Chicago 10, Ill.

Chapter News

The Nicaraguan Chapter of the International College of Surgeons was inaugurated on March 28, 1949, at Managua, Nicaragua, Central America, under the direction of Dr. Desiderio Roman, F.A.C.S., F.I.C.S., who was a special envoy.

The inauguration ceremonies and the first meeting of the Chapter were held in the National Palace and Hall of Congress, and were attended by Ambassadors from the United States, Spain, Argentina and other representatives of the diplomatic corps in Nicaragua.

The degree of Honorary Fellow was conferred upon Dr. Victor M. Roman y Reyes, President of Nicaragua, and the following officers pro tem were elected: Dr. Tomas Pereira, president; Dr. Luis M. Debayle, vice president and Dr. Fernando Velez Paiz, executive secretary.

New Books

Plastic Surgery of the Nose. By Albert P. Seltzer, M.D., F.I.C.S., F.A.C.S. Pp. 305, 221 illustrations. Philadelphia, 1949, J. B. Lippincott Co. $12.00.

The author has written this book as a practical guide to rhinoplasty, setting down the results obtained from many years of experience in what is sometimes called, "cosmetic surgery." Seltzer states that a plastic surgeon should be well grounded in the anatomy and physiology of his field and should have been an assistant to some master for a notable apprenticeship before declaring himself qualified.

Seltzer's technic, as well as others are presented in this book. It covers the examination, step by step, including graphic aids. An important point mentioned on page 57 is that of having the nose surgically clean, free from any acute infection (colds) and sinusitis, if this be possible. However, it is curious how many patients with chronic sinusitis may heal normally, proving a certain degree of immunity in these tissues.

The pictures, diagrams and figures illustrating this text are generally satisfactory and helpful. The final chapter deals with the many causes of failure after attempted restoration, and they should be well studied in order to avoid pitfalls where none seem to exist.

Selected Writings of William Clowes. Edited by F. N. L. Poynter. London, 1948, Harvey and Blythe, Ltd.

William Clowes (1564-1604) was a prominent surgeon of the Elizabethan era in England. His writings, therefore, have definite historical value and strong literary interest. Obviously, few observers in any period are in a better position to report the state of affairs in general than is the physician or the surgeon.

Clowes lived and practiced at a time when the status of a surgeon was anything but enviable; when every new discovery was regarded with suspicion and superstitious fear, when the famous "King's evil" was cured at stated intervals by a touch of the monarch's hand, and when the doctor's fees were paid (if paid at all) as frequently in merchandise as in money. Few practitioners of the period had either the energy or the courage to do any writing. The authentic data are therefore somewhat scanty, and the records and comments made by Clowes gain importance.

The editor of these selections has modernized the archaic spelling for the reader's convenience but has fortunately left the quaint original language unchanged, which makes the book diverting and delightful reading. Clowes was apparently a man of parts. "For my part," he announces stoutly, "I will here set up my rest and contentation, howsoever impertinent and unseemly it may be. That is to say, if I find, either by reason or experience, anything that may be to the good of the patients, and better increase of my knowledge and skill in the art of Surgery, be it either in Galen or Paracelsus, yea, Turk, Jew or any other infidel, I will not refuse it, but be thankful to God for the same." This sentence has an oddly contemporary sound.

A man of forceful and vigorous mind, Clowes did not scruple to call the quacks and charlatans of his time "blind buzzards" and "cracking cumbaters." With regard to their practices his moral indignation reaches a high pitch. "Yea, nowadays it is too apparent to see how tinkers, tooth-drawers, pedlars, ostlers, carters, porters, horse-gelders . . . with other such rotten and stinking weeds do in town and country, without order, honesty, or skill, abuse both Physic and Surgery, having no more perseverance, reason or knowledge in this art than has a goose." Clowes does not hesitate to record names, and adds a long list of patients killed by one Valentine Rasworme of Smaleade, for whom his contempt is unbounded.

Although this charming addition to the literature naturally holds its greatest appeal for physicians and surgeons, it deserves a place on the layman's shelves as well since it provides a refreshing literary experience.

British Surgical Practice. Edited by Sir Ernest Rock Carling and J. Paterson Ross. London, 1948, Butterworth and Co., Ltd. Published in the United States by C. V. Mosby Co., St. Louis, Vol. 4.

This is the fourth volume of an eight-volume encyclopedic work on general surgical practice and technic in Great Britain. The topical arrangement is alphabetical, and the contents are therefore miscellaneous, for example, the chapter "Fallopian Tubes" occurs between "Faciomaxillary Injuries and Deformities" and "Fascial Grafts." The various articles are contributed by many different and distinguished British surgeons. There are 263 illustrations, two of which are color plates.

The successive articles follow, in general, the customary pattern of anatomic orientation, clinical picture, diagnosis, indications and contraindications for surgical intervention, preparation of the patient, operative technic, and [illegible]rative [illegible] In many instances there is a brief survey of results obtained over a period of years, with evaluation of the various methods of surgical treatment. Special aids to diagnosis are frequently emphasized.

The work is well written, well indexed and well edited. Its encyclopedic arrangement makes it highly convenient for quick reference. The contributing authors write as experts in their fields, and the illustrations are well chosen and graphic. The completed series should form an important contribution to the literature of surgery.

Gynecological Histology. By Josephine Barnes. London, 1948. Harvey and Blythe Ltd.

This small, but impressive volume contains 162 splendid photomicrographs showing the cellular pathologic picture associated with various diseases of the uterus, the ovary, the fallopian tubes, the vagina and the vulva, as well as the histologic changes associated with pregnancy. "It has been assumed," says the author, "that the reader has a knowledge of normal and pathological anatomy and histology and of clinical gynecology and endocrinology such as would be expected of a final year medical student." On this basis she has undertaken to provide a simplified but comprehensive view of the general subject and at the same time to offer specimens for comparison. All of the photomicrographs were taken with this in mind from actual slides. Their size and magnification are sufficient to make comparison easy.

Although these fine illustrations necessarily absorb a great deal of the space allotted to the book, the textual portions match them for clarity and completeness. No words are wasted, yet full descriptions are given. The chapter on pregnancy is especially interesting.

Cunningham's Manual of Practical Anatomy. By J. C. Brash and E. B. Jamieson. 3 Vols. Pp. 1446. New York, 1947. Oxford University Press. $12.75.

This excellent manual made its first appearance in 1879 as a dissecting guide, and was written by D. J. Cunningham, one of Britain's most noted anatomists. Arthur Robinson carried on with the work from 1910-1934, while subsequent editions and revisions were perpetuated by the present editors. Since its very inception the *Manual* has remained a steady favorite with English medical undergraduates, later gaining popularity in Canada, Australia, and other members of the British Commonwealth of Nations. More recently, it was introduced in some American medical schools, and if the anatomy course were to receive the prominence it deserves in the curriculum of all medical schools, the work would undoubtedly enjoy wider dissemination, for this manual is undeniably the most comprehensive dissecting guide available in the English language.

It consists of three volumes, the first dealing with the upper and lower extremities, the second with the thorax and abdomen, and the third with the head, neck and brain. But it would be an error to assume that this work is merely a dissecting manual, for despite the modest implication of its title, the manual is virtually a comprehensive treatise of regional anatomy. Instructions for dissection are printed in italics, and these are interspersed thruout the descriptive material as indicated. The illustrations accompanying the text are superb, and are frequently colored.

This set is enthusiastically endorsed for the undergraduate embarking upon the study of anatomy, for the surgeon seeking further proficiency in regional anatomy, and to others who might be generally interested in the subject.

A Textbook of Histology. By A. A. Maximow and W. A. Bloom (Ed. 5). Pp. 700. Philadelphia, 1948. W. B. Saunders Company.

In the 20 years that had elapsed since Maximow first sketched this classical work, it gradually increased in prominence until it became the acknowledged classic book on histology, known and beloved by most medical students. It follows that there remains but little that the reviewer can add about the present edition (fifth) except to sing its praises anew.

The latest edition remains substantially unaltered from its predecessors, except for the following changes: a revision of the histologic description of the lungs, bones, muscles, and endocrine glands; condensation of the chapters on hemopoietic and nervous tissues; some alterations in the treatment of the female generative system; and finally, there are some new illustrations featuring autoradiographs, electron micrographs and photomicrographs made by means of the phase difference microscope.

As a standard textbook of histology, this work ranks high among the best and it is enthusiastically recommended.

The Mechanism of Abdominal Pain. By V. J. Kinsella, M.B., F.R.C.S. Pp. 230. Sydney, 1948. Australasian Medical Publishing Co., Ltd. 32 S/6d.

There are few subjects over which the medical mind is more confused than in the neurologic aspects underlying abdominal pain. With admirable patience and skill, Kinsella has courageously attacked this problem, and has traced our knowledge of abdominal pain from the days of Vesalius to its present status, including the author's own substantial contributions to the scientific investigation of this important topic

While the author's conclusions are well-known to the modern student of neurophysiology, it would not be amiss to repeat them here, in brief. viz that afferent visceral pathways exist; and that heterotopic pains are of two types—splanchnic and somatic Having established these fundamentals, Kinsella proceeds to describe the mechanisms of pain in the more common conditions affecting the abdominal viscera.

The presentation is scholarly, lucid, edifying, and will constitute an important reference on the question of abdominal pain.

Obstetrics and Gynecology. By B M W. Dobbie, M B , F.R C.S. Pp. 358. London, 1948 H K. Lewis & Co , Ltd. 20 S

This short work has been designed primarily to aid the general practitioner who has had little training in obstetrics. Without attempting to infringe upon the utility of the larger, more formal works on this subject, Dobbie has succeeded in creating a fundamental, practical book which nicely supplements the more theoretical treatises Thruout the entire text, emphasis is laid upon treatment Such considerations as pathology, diagnosis and the like are merely mentioned.

The first half of the book is devoted to obstetrics, in the manner indicated already, while the latter half of the work deals with gynecology, in a similar fashion.

This book will prove to be of inestimable value to the novice who suddenly finds himself cast in the role of accoucheur, with its usually trying, concomitant problems

Acute Intestinal Obstruction. By Rodney Smith, M.S , F R C S. Pp. 259. Baltimore, 1948. The Williams and Wilkins Company. $5 00.

This English monograph on intestinal obstructions is worthy of perusal by all surgeons, for it provides a fresh, practical approach to this all-important subject Shorn of all extraneous material, the text is succinctly handled, and described along well organized lines Briefly, the book has been divided into four parts. The first deals with the underlying pathological principles in intestinal obstructions, (with special reference to the changes accompanying simple occlusions) closed loop obstructions, strangulation, ileus, peritonitis, and the like

A second section deals with diagnosis, clinical and radiologic. The portion describing the radiographic diagnosis of intestinal obstruction was written by Eric Samuel, a pioneer in this field.

Next an account of the various lines of treatment, is given (conservative and operative) with generous discussions on the role of chemotherapy, protein balance, etc.

The final section is devoted to a classification and description of the special obstructions, including their appropriate treatment.

This work represents a well rounded contribution on the subject of intestinal obstructions, and makes a welcome addition to contemporary surgical literature

Collateral Circulation (Anatomical Aspects). By Daniel P Quiring, Philadelphia, 1949. Lea and Febiger.

This small volume offers a convenient method of presentation and reference to the chief arterial and venous collateral channels of the body. Some of the diagrams in the book are based on original dissections Simple red and blue diagrams amplify the written text concerning the collateral pathways. The section on "Dynamics of Collateral Circulation" is especially well written

The book will be found useful to students and to those interested in general and vascular surgery. It can be recommended as an excellent reference addition.

Abdominal Operations. By Rodney Maingot, F.R C.S. (Ed. 2), New York, 1948. Appleton-Century-Crofts, Inc.

The second edition of this work consists of 1,231 pages and concerns itself mainly with the surgical technic of abdominal operations. The book is well illustrated, the printing is of excellent type, the bibliography is adequate. Every phase of abdominal intervention is described. There are a number of collaborators The chapter on vagotomy was written by Dragstedt, the chapter on cancer of the cardiac end of the stomach and lower esophagus by Tanner of London, while Dew of Australia discusses hydatid disease of the abdomen. The discussion of congenital intestinal obstruction is contributed by Cokkinis of London, and the work on synchronous combined abdomino-perineal resection by Lloyd-Davis of London. Brock of London contributes a chapter on postoperative chest complications following abdominal operations, and their management, while diaphragmatic hernia is discussed by Harrington of Rochester.

The work is all-embracing, well written and well presented. If one had to make a constructive suggestion, it would be to have, in future editions, the insets in the illustrations shown on a larger scale, though the question of space may have curtailed this possibility. Also, a more accurate presentation of known historical facts should be presented.

It is readily conceivable that in these stressful times and the changing scene in medical endeavor, authors sometimes entrust their abstracting of the literature to assistants. Regrettably, inaccuracies have crept into Maingot's work which are so obvious and disturbing that some may be pointed out which may be corrected in forthcoming editions of the work.

For example on page 376 the author, in speaking of gastrostomy, states that Spivack "described an ingenious method, the characteristic nature of which is the formation of a valve at the base of the tube." The facts are that Spivack designed neither the tube nor the valve, nor was he the first to adopt the combination principle. The credit for forming the tube unreservedly belongs to Janeway and Dépage. These pioneers reported this innovation about *thirty years before Spivack's voice was heard.* The formation of a nonleaking valve was accomplished by Prof. Fontan of Toulouse, who in 1896 described a method of valve formation before the French Congress of Surgery, *thirty-three years before Spivack* decided to speak of a "new" valve. The combining of the two procedures was accomplished by H. Watsudji in 1899, *thirty years before Spivack's report* (Mitteil med. Ges. Tokio XIII 079). Thus, after more than a quarter of a century, Spivack borrowed the ideas of Janeway and Dépage (tube formation) and Fontan's valve, supplemented by Watsudji's work, and called the result a "*new procedure.*" (*sic.*)

Again, on page 672, in speaking of dissolving gallstones in the common duct, Maingot states that this method was "originally suggested by Pribram in 1935." The facts are that ether, as a solvent for gallstones, was used by an Englishman, J. W. Walker, in 1891, *forty-four years before Pribram mentioned it.*

Outside of such historical inaccuracies, this work can be warmly recommended. It contains much information, and the operative procedures are lucidly described. The book will and should be as well received as were Maingot's previous works.

Virus Diseases of Man. By C. E. van Rooyen, M.D., M.R.C.P., and A. J. Rhodes, M.D., F.R.C.P. Pp. 1202, illustrated. (Ed. 2) New York, 1948, Thomas Nelson and Sons. $22.50.

The purpose of this book is to provide a volume of reference for all who are working in medicine in the generic sense, including veterinarians. In fact veterinarians are much desired as colleagues since they can furnish material and a follow-up which is not easily acquired by others. Since the first edition was published about 10 years ago, many advances were made in the fundamental and applied principles of virus studies, which made this revision imperative.

It is true in all fields today that what we set forth as definite and certain postulates must be adjusted and accommodated to new concepts and technics. Some of these are named: the electron microscope, the use of fertile eggs for cultivation of viruses, newer aspects of such diseases as mumps and influenza, diagnosis and prevention of small pox, poliomyelitis, Colorado tick fever and the new interest in multiple sclerosis aroused by groups which are being organized for scientific investigation.

It is evident that we are recognizing more and more that no matter how great the progress made in controlling many diseases of bacterial origin, we still have a long way to go before we can come to grips with virus diseases.

Viruses were discovered at the turn of the century and it became immediately evident that they would offer great resistance to the ordinary laboratory procedures. For one thing they are difficult to culture on ordinary media no matter how enriched, for they will grow only in the presence of living cells. They exhibit a very high degree of parasitism. Some 20 years ago progress was made when the two Maitlands were able to grow vaccine virus in a medium containing "hen's kidney and serum." This sounds like the witches' broth in Shakespeare! Since that time (1928) we have the methods of Findlay, Smith, Tamura, Dochez, Mills, Kneeland, Li and Rivers, and Webster and Clow's procedure for growing rabies virus in bulk. These are all bewildering to the non-technician.

Since influenza is a dreadful killer when epidemics strike, it is quite natural that such effort has been spent, particularly by the military, in ferreting out the reasons for resistance to ordinary medication. Even penicillin and the sulfas seem stymied here. Both the parasite and the host are variable quantities in the battle for supremacy. To begin with there are at least two kinds of "flu virus" which investigators call A and B. They offer no "cross immunity", that is, if a person has recovered from influenza type A, he may come down again with a type B infection. This probably accounts for the saying that "I had grippe twice last winter", an observation painfully made. Possibly there is also a virus Y as yet unisolated and antigenically distinct from the A and B classification. Clinically speaking, there are grades of virulence, and these authors say that a virus of low virulence will not protect a person against the same virus when "stepped-up". Some state that influenza virus may elaborate a toxin which determines the virulence of a given strain. The level of circulating antibody is highly important in determining susceptibility to infection "Serum antibody is stimulated by vaccination" and may confer immunity by rising above a certain level During a reinfection, the mucous membrane in the nose and throat is infected superficially at first. Then, if antibodies are present in sufficient potency to fight off these invaders, the attack may be light,—"a touch of the grippe" in common parlance! Allergy and structural changes in the respiratory mucous membrane may account for the degree of severity, for recovery or for a fatal outcome

The list of "Rickettsial diseases" is likely to be lengthened as time goes on At present, Rocky Mountain spotted fever is the type, and seems to be carried by a tick to dogs, then to humans. But there are also psittacosis and typhus which may be classified since their symptoms and signs are not well differentiated from some other like conditions

In spite of this book's size (which records all that investigators have been able to determine as to viral conditions which are destructive to human health and life) we evidently have a long way to go before understanding the stated problems well enough to conquer them Acquired immunity occurs, perhaps more often than we suppose, but induced immunity is still in the stage of wishful thinking.

In reading this book, one must realize what future medical students shall have to contend with in their effort to acquire a working knowledge of viral conditions These are quite separate and apart, biologically, from those bacterial diseases science has just begun to understand and to control Another 10 years may make this amazing volume obsolete save for the background which it has so carefully laid

The Surgery of Abdominal Hernia. By George B Mair, M D Pp 408 Baltimore, 1948 The Williams & Wilkins Co $7 00

This new English monograph on the subject of hernia deserves a prominent niche in the literature of this important surgical topic With laudable, scientific appraisal, the author has keenly analyzed the results of the Bassini operation, with its 70 odd modifications currently in vogue, and the unshakable conclusion is there, for all but the most biased surgeon to behold, viz. the popular Bassini repair yields an average recurrence rate of 11 percent for oblique hernias, and 18 percent for direct ones! Mair describes the essential errors in the Bassini technic, and cites more effective lines of surgical therapy, devoting, among them, an entire chapter to skin graft repairs

Other types of abdominal herniae receive full critical consideration by the author. This work yields interesting—if controversial—information to all surgeons

An Introduction to Surgery. By Rutherford Morison, M D, and C F M Saint, M D. Pp 330 Baltimore, 1948. The Williams & Wilkins Co $10 00

The present edition is the fourth to appear, thus confirming the popularity of this work by two eminent South African surgeons and teachers. Since the death of Morison, the credit for the fourth edition goes solely to the remaining contributor.

This short book deals essentially with fundamental surgical principles, and was designed primarily to suit the needs of the medical undergraduate embarking upon his surgical career It could also be used with equally good purpose for teaching the elements of surgery to nurses The subject matter deals with such fundamentals as shock, wounds, hemorrhage, sepsis, inflammatory changes, vascular interference, infection and malignancy The final chapter endeavors to cite illustrative clinical pathologic cases, which should impress the reader as an admirable synthesis of the various surgical principles previously outlined

The work is warmly recommended as an elemental textbook for the student beginning his studies in surgery.

Bacterial and Mycotic Infections of Man. By Rene J Dubos, Ph D, and contributors Pp 785. Philadelphia, 1948 J. B Lippincott Co. $5 00

This book is a practical manual of clinical bacteriology and mycology. The first 200 pages are devoted to the consideration of such topics as the history of bacteriology, morphology, and metabolism of bacteria, pathogenic properties of bacteria, host-parasite relationships, immunity, allergy, etc The remainder of the book describes in considerable detail the more common microorganisms of clinical importance, and includes an excellent chapter on mycology proper Viruses and rickettsiae are omitted from the discussion

The work has been prepared under the senior editorship of Dubos, and was written by 33 separate collaborators, garnered from the bacteriology departments of a number of eminent medical schools and research centers thuout the continent Primarily designed for use by the undergraduate, it will prove of inestimable aid to practitioners and others interested in bacteriology

Needless to say, this is but one of a large number of excellent texts dealing with the clinical aspects of bacteriology, but it differs from the others in one important respect We refer to the amazingly low price of the work, a feature which should appeal to the frequently light purse of the medical student. It may be of interest to note that the publication costs were partially defrayed by a grant from The National Foundation for Infantile Paralysis; but whatever the reason, the low cost of this useful book should allow for its widespread and deserved dissemination.

Pain Syndromes. By Bernard Judovich and William Bates. (Ed. 3). Philadelphia, 1949. F. A. Davis Co. $6.00.

The original edition of this scholarly study of pain, segmental tenderness and treatment by paravertebral nerve block presented many data of great importance in diagnosis as well as in treatment. The authors expressed the opinion that this syndrome may justly be considered a clinical entity from the therapeutic point of view, and that the clinical picture is usually somatic rather than visceral in origin. Abdominal pain, low back pain, the scalenus anticus syndrome, sciatic nerve pain, trigeminal neuralgia, herpes zoster, and pain in the brachial plexus were among the conditions discussed. The authors suggested "segmental neuralgia" as a term designating pain combined with segmental tenderness.

The third edition has been enriched by several important additions. In the chapter on pain of the brachial plexus, the material on etiology and diagnosis has been thoroughly revised with new methods of clinical examination and aids to successful differential diagnosis. Severe backache, due to endometriosis, is discussed with a number of illustrative case reports. Intravenous procaine therapy for the control of pain is explained in detail. Migraine is investigated from the point of view of arresting the pain before it becomes severe. Atypical pain of the face is made the subject of a whole new chapter.

The halftones and line drawings that illustrate this book cannot be too highly commended. Chapter four, entitled "The Dermatomes," is particularly striking. Detailed and numerous line drawings show clearly the segmental areas in which neuralgic pain occurs. The chapter on posture as it is related to abdominal pain contains many significant and useful facts for the clinician. Postural nerve pain due to physical abnormality, such as inequality in the length of legs, is included in the discussion.

Pain due to pinching or piercing of nerves in postoperative scars is dealt with in a separate chapter, with some telling comments also on abdominal pain due to adhesions. A full and interesting chapter is devoted to the control of pain in malignant disease.

Parabertebral nerve block by infiltration is explained step by step. Procaine is the agent of choice. "Whenever possible," say the authors, "we have refrained from using alcohol in our regional therapy. . . . Alcohol often produces an unpleasant aftermath in the form of severely painful neuritis. At times we use it when the aqueous solutions will not control the pain. . . . *It should never be injected into the vicinity of the nerves which control vital motor function.*"

In concluding, the authors warn against a too hasty classification of any pain syndrome as psychosomatic. "Applying the term 'psychosomatic' to patients only because no disease or evidence of the cause of pain can be found is an implication that we have knowledge of all the causes of pain. This is far from the truth." This emphasis deserves special commendation.

Review of Nelson's Diagnostic Roentgenology. By Dr. Ross Golden. Vol. 1 and 2. New York, 1948, Thomas Nelson & Sons.

The vast amount of new literature in the field of roentgen diagnosis, which has accumulated since the last printing of Nelson's, *Diagnostic Roentgenology,* is splendidly sifted in the new additions and revisions. The wise restriction of both the text and illustrations to topics of practical significance will further secure the reputation of Nelson's, *Diagnostic Roentgenology* among the most popular and most instructive books for the practicing roentgenologist.

The following chapters are revised or amended: In Vol. I Chapter II, *Roentgen-Ray Examination of the Paranasal Sinuses and the Mastoids,* by G. W. Grier; *Further Considerations,* in Chapter III, part II, of *Radiology of the Chest,* by Coleman B. Rabin; Chapter V, *The Roentgen-Ray Examination of the Digestive Tract,* by Ross Golden. In Vol. II Chapter VIII, *Roentgenologic Diagnosis of Diseases of The Urinary Tract,* by Marcy L. Sussman; Chapter IX, *Uterotubography,* by Samuel A. Robins and Albert A. Shapira; and a number of newer pelvimetric methods in Chapter X, *The Use of The Roentgen Ray in Obstetrics,* by Howard C. Moloy and Paul C. Swenson.

Also the index was brought up to date. The illustrations deserve particular praise. Each of them is instructive, and the reproduction even of difficult details such as the structure of the mastoids, is highly satisfactory.

Oral Surgery. By Kurt H. Thoma. St. Louis, 1948, C. V. Mosby Co. Vol. 1.

This massive work on oral surgery will interest both doctors and dentists. "It should be used," says the author, "in conjunction with *Oral Pathology,* which gives in greater detail the etiology, pathogenesis, and morbid anatomy and histology of the region dealt with by the oral surgeon" It is especially recommended to the general practitioner, who will probably agree with the author that general supportive care of the patient is of major importance here as elsewhere.

Most of the book was written during the establishment of a clinic of oral surgery at the Massachusetts General hospital, at a time when significant changes in therapy and therapeutic agents were taking place These changes resulted chiefly from the introduction of the sulfonamides and the antibiotics, as well as penicillin and streptomycin

The importance set by Dr. Thoma on the general welfare and supportive treatment of the oral surgical patient is evidenced by the fact that his opening chapter is entitled "Principles of Surgery" and contains a reemphasis of general principles that many authors would have considered unnecessary. In addition to this, there is a chapter on the general care of the patient. Only after these matters have been thoroughly discussed does Dr. Thoma proceed to special surgical technics for handling the various diseases and abnormalities of the oral region. Successive chapters then deal with dentoalveolar surgery, traumatic diseases of the jaws, odontogenic diseases of the maxillary sinus, and osteomyelitis The sections on dentoalveolar surgery and traumatic diseases of the jaws are immensely long and detailed, running the whole gamut of conditions in these two categories.

Many highly illustrative case reports implement the discussions The book is also well illustrated pictorially, containing 1631 halftones, line drawings and color plates The arrangement is logical and orderly and the writing extremely lucid. Each chapter is furnished with a bibliography of the recent and pertinent literature The work in general conforms to the highest standards and has a special timeliness in that it contains new information on new methods and new materials

Medicine Throughout Antiquity. By Benjamin Lee Gordon Philadelphia, 1949, F A. Davis Co.

Archeology and anthropology, as well as treatises on specific medical and surgical problems, have their messages for the doctor of today The history of medicine in the dim dawn of antiquity is always a fascinating study In this splendid new book Dr. Gordon has pursued the Aesculapians far beyond their acquisition of the title, for his account begins with prehistoric man To this hitherto nebulous area of human knowledge the first part of his work brings new and revealing light. The second part, which deals with the Graeco-Roman period and ends with the fall of Rome in 476 A.D, is no less interesting and revelatory.

Pointing out that until the promulgation of the Darwinian theory of evolution no particular study was made of the habits and practices of mankind more than some 6000 years back, Dr. Gordon now examines the paleolithic evidence of prehistoric medical practice and finds it more plentiful than might be imagined. From fossil skeletons and skulls, as well as from crude drawings and sculptures in prehistoric caves, he deduces much of immediate interest to the surgeon. From ancient records and folklore dealing with primitive concepts of disease and death, he obtains many intriguing data on superstition and black magic and their application both to healing and to the destruction of enemies. Nature worship and the influence of earth, air, fire and water are discussed.

The medical beliefs and practices of Chaldea, Babylon and ancient Egypt are outlined, together with comments on their effect upon modern medicine. India and Persia are shown to have made their unique contributions, as are China and Japan. Nor is the medical history of the primitive American Indian neglected.

The history of early Greek medicine bristles with famous names—Aesculapius, Chiron, Melampus, etc., and reveals the establishment of schools for the training of physicians. The strong interrelation between medicine and Greek philosophy is examined With the appearance of Hippocrates and the Hippocratic system, the status of medical art reached a new and higher level, not only scientifically but from the humanitarian point of view. As the then current theories and ideas permeated into the Roman Empire, various schools of thought—e g, the dogmatic, the encyclopedic, the empiric, and the eclectic—made their appearance. The fabulous Galen, whose heyday took place in the second century of the Christian era, was to dominate medical history for several centuries after his death.

All this, in Dr. Gordon's excellent history, carries the interest of genuine drama, the reader sees the whole panorama unfold before his eyes. In his concluding section, which deals with Talmudic medicine, one finds a field that is little known, comparatively speaking, but none the less memorable for that. Altogether, the reading of this book is a rich and enriching experience, for which any reader, physician or layman, will be much the wiser as to the history of healing.

Abstracts from Current Literature

Treatment of Bone Sarcoma. C. Howard Hatcher, *Rky. Mts. Med. Jr.*, 1948, 45:999.

Treatment of the various histologic types of bone sarcoma is discussed. In general the dismal prognosis associated with bone sarcoma is justified, nevertheless, a favorable result occasionally follows treatment. There is a survival rate which compares favorably with the results of treatment of malignancy in other tissues. Advances in surgical therapy and irradiation technic have improved the patient's chance of survival and the function of the affected bones.

He points out that in many instances fibrosarcoma, slowly growing chrondrosarcomas, round cell sarcoma and reticulum cell sarcoma may be treated by regional resection rather than amputation together with adequate x-ray irradiation. In general osteogenicsarcoma and the faster growing chondroscarcomas should always be treated by amputation and irradiation. Amputation in all types may be justified even in the presence of wide spread metastasis for relief of pain or severe ulceration or when it becomes mechanically inconvenient to the patient.

The treatment of metastasis, whether they be single or multiple, should be carried out when they are amenable to irradiation. X-ray irradiation is preferred over radium, while the use for the radio active isotopes is looked upon with interest. Several unusual cases are presented. They help substantiate the author's contention that however hopeless cases may appear, treatment should never be withheld.

George J. Baer

Visualization and Photography of the Uterine Canal. W. B. Norment, *N. C. Med. J.*, 1948, 9:619.

Uterine canal pathology is now more completely diagnosed by hysterogram and hysterocopy.

Radiographic hysterograms are made in the office preferably when there is no bleeding, the radio-opaque dye being injected through a canula with a detachable catheter tip and a plastic acron to keep the dye intrauterine. With active bleeding a thin rubber bag is used to contain the dye and prevent contact with the endometrium.

Polyps and submucosal myomas usually produce rounded, punched out defects. Multiple myomas produce "shelving" or shading out of the dye. Endometrial proliferation produces a defect smooth in outline compared to the normal hysterogram. Carcinoma produces various defects from slight irregularities to an extensive lace life defect—it may mimic the defect seen in endometrial hypertrophy. Where carcinoma is suspected or the diagnosis is not definite, tissue examination and direct visualization should be done in conjunction with x-ray examination.

First attempts at direct visualization combined reflected light with a metal tube—giving a small field obscured by blood running in the tube. Next a lens system was sought which could produce slight dilation of the uterine canal. To prevent the clotting of blood on the lens, rubber, plastic and glass sheaths were tried. The former two limited vision and were relatively opaque, the latter dangerous if broken.

The hysteroscope now used consists of a metal sheath and obturator removable after insertion. The obturator is replaced by a close fitting sheath which can be moved back and forth containing the optical system covered by a transparent window. On insertion a column of air is forced into the uterine canal causing a slight dilation.

Preparation and anesthesia for hysteroscopy is as for a dilation and curettage. After cervical dilation the outer sheath is inserted and the patient put in a Trendelenburg position. On inserting the second sheath, pathology may be noted on passing the cervix, after which it can be carried forward for closer observation. A better view is obtained on withdrawing the tube than when carrying it forward.

Photographs have been made in black and white and color through this instrument.

Carcinoma is seen as a whitish gray growth in great contrast against a red background. In the cases seen there was no doubt as to the diagnosis but in doubtful cases curettage is indicated.

An operating hysteroscope is now being constructed to take biopsies under direct vision.

Everott Drews

The Diagnosis of Bone Sarcoma. C. Howard Hatcher, *Rky. Mts. Med. Jr.*, 1948, 45:968.

The author discusses the histologic types of bone sarcoma according to tissue differentiation, which includes fibrosarcoma, osteosarcoma, chondrosarcoma, round cell sarcoma, reticulum cell sarcoma, hemangioendothelial sarcoma and myeloma. He presents case histories to substantiate his belief that the role of biopsy is paramount in the management of bone sarcoma, and agrees with prevailing opinion that diagnosis often seem evident from x-ray.

Attention is directed to the theoretical objection, that cutting into a tumor may produce metastasis is not supported by fact, and the advantages of tissue biopsy far outweigh any disadvantages real or theoretical. Biopsy with accurate classification of a tumor is of prime importance in management of any given case. A biopsy specimen should be generous and, if possible, should be removed from various sections of the tumor. This permits the study in various fields where the histologic cell type may be varying *The reliance solely* upon clinical information has led to misleading diagnoses and needless sacrifice of limbs when the pathologist found the tumor in the amputated limb to have been benign

The author presents no new principles but merely reiterates well established surgical principles.

GEORGE J. BAER

Review of the Literature on the Injuries of the Pancreas and a Report of a Case of Successful Suture of an Isolated Subcutaneous Rupture of the Gland. A Abu Zikery, *J. of Royal Egyptian Med Assoc.*, 1948, 31 677.

The author comments upon the poverty of literature touching pancreatic rupture and injury and reports a successful case of subcutaneous rupture treated by suture, where the pancreas was split against the vertebral column from border to border of the gland and healing resulted without either pancreatic fistula or cyst A classification is presented of penetrating, non-penetrating and operative injury A discussion ensues as to whether injury dividing the pancreas into two parts, the distal part should or should not be removed.

The paper suggested that the decision should perhaps rest on whether the main pancreatic duct is or is not ruptured The case reported is described in detail, the rent being complete, apparently duct and all The gland was closed by five interrupted catgut sutures and no omental graft, packing or drainage tube was used. A gauze drain was left in situ Postoperative pain was intense for four days and then relieved The patient remained in hospital for three weeks, reported at outpatients' department at three month intervals for two years and was soundly healed without fistula or postoperative cyst formation.

A second case under the care of Professor Kateb is included in the report There is a short historical review with reference to 18 previously reported cases A discussion of the anatomical and physiological structure of the pancreas is developed. Injury of the pancreas during splenectomy, an operation common in Cairo, is discussed. This is usually minimal due to inclusion of the tail in sutures A fatal case with fat necrosis at autopsy is reported

The paper reports a series of 21 cases culled from the literature by Macquot and Constantini (1923) in which 21 treated surgically with 16 recoveries, nine symptomatically with nine deaths. Urgent recommendation for immediate surgery is advanced Omental flaps-fibrin film substitutes are discussed. There are four illustrations and several appropriate acknowledgements.

LYON H. APPLEBY

Coarctation of the Aorta. H. D. Adams, D. I. Rutledge, C. R. Souders, *J.A.M.A.*, 1949, 139: 362.

Recent development of a surgical technic for coarctation of the aorta makes it imperative that all physicians be alert to the possibility of this condition when confronted with hypertension in a young person. The most important diagnostic point is to bear the condition in mind. Not infrequently a diagnosis of essential hypertension is made and patients are referred for lumbodorsal sympathectomy. The arterial pressure in the arm should be compared to that in the legs. Normally it is higher in the legs than in the arms, but this situation is reversed when coarctation of the aorta is present X-ray examination of the thorax and angiography with diodrast are other aids to diagnosis

The age of the patient has an important bearing on the selection for surgical treatment. The vessels of younger patients are less friable and more elastic and lend themselves more readily, therefore, to surgery This is especially important if the constricted area is to be resected and the two ends of the aorta are to be anastomosed If the direct anastomosis is not feasible, the left sub clavian artery is anastomosed to the descending aorta below the site of the coarctation.

The authors describe their technic in the management of five cases of coarctation of the aorta. They make a left posterolateral approach, resecting the fifth rib and dividing the adjacent ribs. The arch of the aorta is mobilized by ligating the intercostal vessels and the ligamentum arteriosum or the patent ductus arteriosus.

The hazard is the extreme friability of the blood vessels and extensive collateral circulation. The divided vessels are controlled by use of a Bradshaw clamp and a rubber catheter is applied behind the clamp for additional safety. Anastomosis is made with an everting interrupted mattress suture reinforced with continuous sutures over each half circumference. The mediastinal pleura and thorax are closed, leaving an intercostal catheter for suction.

None of these patients suffered severe shock or circulatory collapse when the aortic clamps were removed. The authors suggest that such a complication is avoided by keeping the subclavian vessel shut off while the anastomosis is allowed to function, and then after the patient has adjusted to a minor drop in blood pressure which follows this procedure, the clamps should be removed slowly from the subclavian artery. In this way it is possible to avoid having both these large channels open at the same time with resultant decided lowering of the blood pressure. A minor drop also occurs when the lung is reexpanded and the pulmonary vascular bed increased.

The operation requires a well developed surgical team and skilled anesthetists, but apparently can be carried out with considerable safety. It should be performed before the deteriorating effects of hypertension have produced irreversible changes.

M. T. Friedell

The Surgical Treatment of Polyposis of the Colon. F. W. Rankin, and J. G. Webb, *So. Surg.*, 14: 761, No. 10.

The early diagnostic development of polyposis of the colon, including the variations in the classifications of this disease, as advocated by Erdmann and Morris, Wesson and Bargen, Hauser, Wechselmann and Schmeden, and Westhaus is reviewed. The writers classify their own 10 reported cases of true adenomatous polyps into three groups, as originally proposed by Fitzgibbon and Rankin:

Group 1: Those polyps in which the epithelium retains its normal characteristics. These tumors are nodular and are supported on stalks of loose connective tissue from the submucosa; they vary in size from 3 mm. to 1 or 2 cm. in diameter. There is no indication that these polyps are more prone to malignancy than normal intestinal mucosa.

Group 2: The tumors of this group show widespread failure of epithelium to differentiate into units of normal mucosa. The cells are hypertrophied and elongated and may be piled into multilayered buds which project into the lumen of the tubules. Papillary structures may develop. These tumors attain the greatest size of any polyps and are frequently overtaken by malignant changes.

Group 3: The tumors in this group are not sharply demarcated from the growths in group 2 but are composed of the accentuated forms of group 2. These tumors are limited to 6 to 8 mm. in diameter, and the cellular structure is so rudimentary as to be hardly recognizable as mucosa. The rate of epithelial proliferation is so great there is practically no connective tissue stroma in the tumor.

The incidence of congenital polyposis in the general population has been estimated from 0.13 percent in children to 21.4 percent in all age groups. The symptoms of polyposis may be negligible. The outstanding symptom is blood in the stool (present in eight cases). Other symptoms were cramps (five cases), diarrhea (four cases) and tenesmus (one case). Two patients were asymptomatic.

The hereditary factor in diffuse polyposis is discussed. In two patients no family history was obtainable; of the other eight patients, five had a family history of polyps, and six of the eight had a family history of colon carcinomas.

Diagnosis of this disease is made by proctosigmoidoscopic and roentgenologic examination, employing the double contrast technic. The treatment of diffuse polyposis is surgical. Rankin and Webb advocate a subtotal colon resection with an ileosigmoidal anastomosis (lower sigmoid), thus preserving the sphincter and eliminating an ileostomy. This procedure was followed or preceded by fulguration of the polyps in the rectum and lower sigmoid. This therapy was instituted in four of the reported cases. These cases are to be followed and sigmoidoscoped at regular intervals. Of the 10 cases, two had developed carcinoma. There were two deaths postoperatively.

In a genealogical table the authors point out that the family of one of the patients had an incidence of 54.17 percent of either carcinoma of the colon or diffuse polyposis; 24.99 percent were untraceable, and 20.83 percent were free of colon disease.

Louis Rivers

Early Ambulation in Obstetric and Gynaecological Cases. Richard De Soldenhoff, *Lancet*, 1948, 2:961.

To the author, early ambulation means "out of bed on the third postnatal or postoperative day," although occasionally when pulmonary complications were threatening he followed Leithauser's technic of having patients out of bed to cough within eight hours after the ordeal.

His results with obstetrical patients after a year's trial are compared with a previous year when early ambulation was not employed. The drastic reduction in hospital days was impressive.

Obstetric patients usually sit on the edge of the bed and swing their legs 12 hours after delivery. The following day leg exercises are instituted in bed, and on the third day walking is encouraged. The procedure is applied to all normal deliveries, including patients with tears and episiotomies. Pre-eclamptic patients are not ambulated. Early ambulation does not interfere with healing.

There were equally good results in 212 gynecologic cases. There were no deaths from pulmonary embolism or respiratory complications

Only double no 0, double no 1, and medium hard catgut were used All suturing, whether in the abdomen or on the pelvic floor was continuous Enemas were used on the fourth postoperative day

The author is convinced that patients recover more rapidly and get along better in every way when ambulated early, and that there is no immediate harm from early ambulation to either obstetric or gynecological patients

D J Leithauser

Carcinoma of the Stomach G E Moore, D State, R Hebbel and A E Treloar, *Surg Gynec. and Obstet*, 1948, 87 513-518

This study was actuated by Schindler's suggestion to base operability of patients with carcinoma of the stomach upon the classification of Borrmann, introduced in 1901 According to this classification four main groups of patients were recognized Group one consisted of those patients presenting sharply demarcated polypoid carcinomas Group two consisted of sharply demarcated ulcerated carcinomas Group three consisted of partly infiltrating carcinomas, and group four the diffusely *infiltrating carcinomas* The authors present a follow-up of 124 of a group of 343 patients operated upon at the University of Minnesota during 1938-1943 A gastric resection was the operation done in all cases, and the follow up carried out to 1947

As a result of this study, it was noted that the presence or absence of regional lymph nodes among the patients subjected to gastric resection had far greater prognostic significance than did the Borrmann type of tumor Although it was true that the Borrmann types 1 and 2 with limited tumors provided a proportionately larger number of patients free of metastases, and hence were more likely to survive, nevertheless since the presence or absence of metastases cannot be determined preoperatively, no patient should be denied operation because of the type of tumor he may be determined to have gastroscopically The recent introduction of the thoraco abdominal approach to high lying lesions of the stomach as well as metastases will do much to increase the resectability rate as well as the survival time

M O Cantor

Pressblockade des Rectums bei tiefer Fossa rectogenitalis. Lennart Wallden, *Upsala Lakareforenings Forhandlingar*, 1948, 5 267 285

Wallden describes first the embryology and anatomy of the fossa rectogenitalis (cul de sac of Douglas). If we find in adults an abnormal low position of these tissues, the disposition to different anomalies is given (hernia perinealis). The connection between the prolapsus recti with the low position of the Douglas pouch is recognized since the publication by Ludloff and Jeannel The author had occasion to study in the last years certain anomalies in the defecation connected with an abnormal low situated Douglas pouch The clinical picture shows first of all the subjective symptom, that on the occasion of defecation the patient feels a barragelike hindrance within the rectum The result is that the feces are released intermittently. The consistency of the feces is normal Purgatives are useless On rectal examination one finds a deep anorectal ring and a low situated soft mass of tissues corresponding to the low situated pouch of Douglas The x-ray picture is characterized in such patients by dislocation of the anus in dorso caudal direction. The sigmoid and the loops of the small intestine are pushed downward The surgical treatment of that anomaly is similar to the operation performed in cases of rectal prolaps According to Moschkowitz and Hulten that is the obliteration of the fossa rectogenitalis with resection of the sigmoid and temporary anus iliacus Seventeen cases have been operated on successfully

Felix Mandl

One Hundred Cases of Congenital Absence of the Vagina. Allen L Bryan, Joseph A Nigro, and Virgil S Counseller, *Surg Gynec and Obstet*, 1949, 88 79

A brief review of the embryology of the female genital organs is presented in a very informative manner This is followed by a chronologic review of the surgical procedures instituted for construction of a functional vagina in cases of congenital absence of the vagina These methods include bowel transplants, labial grafts, grafts from the thigh, free skin grafts, simple reconstruction, miscellaneous procedures and simple pressure

The incidence of congenital absence of the vagina has been stated as varying from 1 in 4,000 to 1 21,000 female patients

In the 100 cases presented, the age incidence varied from 14 to 49 years—average age, 23. The family history was negative in 96 cases. One patient's sister had congenital absence of the vagina. Amenorrhea was present in 99 cases. One patient menstruated normally, but through the urethra. One patient had vicarious menses through the lungs and rectum. Periodic cramp ' ' pain in the lower abdomen was present physical examination of 61 patients with normal secondary sex characteristics no internal pelvic organs were palpated, tubes, ovaries and uterus were palpated in 19 patients, tubes and ovaries were palpated in nine, uterus alone palpated in nine and the ovaries alone in two. The psychological and emotional attitude was normal in 88—fair in four and poor in eight.

Abnormalities of the urogenital system were present in 21 out of 41 patients submitted to urologic examination, other abnormalities were not as important. On 26 patients who underwent pelvic surgery, four had normal pelvic organs, three had hematosalpinx, three had endometriosis, and 10 had normal tubes and ovaries but a malformed uterus.

In the procedure discussed by the authors, a transverse incision is made between the urethra and rectum. This is to be the site of the vagina. The tissue is dissected by blunt dissection between the rectum and bladder. A non irritating mold is worn for six months or longer until the contractile period has passed. This procedure is not complicated by the morbidity, mortality or pelvic cellutitis that complicates the other procedures. The hospital stay is shortened and the operation is rather simple. The vagina produced is normal in depth, diameter, and mobility.

FRANK S. OSER, JR.

Sur Les Tumeurs De L'ovaire. R. Desjacques, *Lyon Chirurgical*, 1948, 43:533.

Desjacques reviews the clinical aspect of the solid tumors of the ovaries. Fibromas of the ovaries are well defined and may produce referred pain in the pelvis or in the kidney region. The malignant tumors show ascites, abdominal mass and symptoms of compression. Vaginally there is a leucorrhea or bleeding. Metastases are seen in the umbilical or pulmonary regions and coexistence of tumors of the digestive tract are frequently observed. As for rare tumors the author discusses seminomas. Endocrine tumors constitute the most frequent type and are the results of direct hormonal action. The arrhenoblastomas are tumors which may affect the morphologic appearance of the patient. The treatment consists in complete hysterectomy in cases of suspected malignancy followed by radiotherapy. Recurrences are frequent.

MARTIAL BOURAND

The Present Position of Neurosurgery in Gynecology. Albert Davis, *Brit. Med. J.*, 1948, 2:585.

The author reviews the history of neurosurgical procedures for pelvic pain and evaluates these as to procedure, indications and results.

Resection of presacral nerve first described by Cotte in 1925 was an extension of Leriche's pioneer work of the same year. The sympathetic nerves to the uterus carry motor contractile fibres and also contain the majority of sensory fibres from that organ. The operation is curative in severe dysmenorrhea and is indicated when conservative measures have failed. Visceral pain of pelvic cancer is also relieved by this procedure. The technic of presacral nerve resection is discussed. The author particularly stresses removing all of the areolar tissue rather than trying to identify separate nerve filaments. The operation gives satisfactory results for primary dysmenorrhea in about 70 percent of patients, depending upon thoroughness of technic and proper selection of patients. In secondary dysmenorrhea it should be regarded as an adjunct to surgical correction of other pathology.

It is estimated that 12 percent of primary dysmenorrhea is ovarian in origin. The nature of nerve supply is such that ovarian sympathectomy can only be accomplished by division of the infundibulo-pelvic ligament. It is questionable whether the advantages outweigh the disadvantages of this procedure and in general it should be reserved for the most urgent indications in carefully selected patients.

Lying as a compact sheet over the ampulla of the rectum, beneath the pouch of Douglas, is the main uterine ganglion, the pelvic plexus. Alcohol injection of the pelvic plexus may relieve severe spasmodic dysmenorrhea, painful parametritis and vaginal neuralgia. Of 61 cases reported, 70 percent were permanently relieved.

Intrathecal alcohol injection, on the other hand, has the advantage of being applicable to bed ridden patients at home, and in about half of the patients with inoperable carcinoma it gives permanent and complete relief. Incontinence of feces and urine is not an infrequent sequel. Bates and Judovich (1942) substituted magnesium sulfate for alcohol in an attempt to circumvent some of the undesired side effects. Many have been disappointed with this method, while others are optimistic.

The uterosacral ligaments carry some of the main branches of the pelvic plexus to the uterus. Section of these ligaments is justifiable when laparotomy is necessary to correct other pathologic conditions, otherwise they should be approached through the vagina. The principal indications for uterosacral resection is lymphangitis secondary to cervicitis producing chronic low back pain aggravated by walking, menstruation, and coitus (posterior parametritis syndrome).

Uterosacral alcohol injection is a useful adjunct to pelvic plexus and it is said to be particularly valuable for dispareunia due to uterosacral spasm whereas epidural or caudal procaine analgesia has been moderately successful in the handling of the pain of carcinoma Temporary blocking with novocaine of the first and second lumbar ganglia has been suggested as a test in pelvic neuralgia, dysmenorrhea and carcinoma to determine if presacral neurectomy will be effective Section of the lateral spinothalamic tract by laminectomy on the other hand is a serious major procedure and is only occasionally indicated

VICTOR T. HUDSON

The Treatment of Acute Peritonitis. W A Altemeier, *J A M A*, 1949, 139 347

The author reviews experience obtained during the past six years with 598 cases of acute septic peritonitis secondary to acute appendicitis, perforated peptic ulcers and penetrating wounds of the abdomen Primarily, successful management depends on early diagnosis and good surgical intervention Chemotherapy and adequate supportive treatment are important secondary measures As yet there is no specific therapy for acute peritonitis, and chemotherapy must not be considered a substitute for prompt diagnosis and early operative repair or removal of the primary source of infection In comparing results obtained in 685 similar cases treated with chemotherapy, the author reveals that mortality has been reduced approximately 60 percent This reduction is credited to chemotherapy

ULYSSES G DAILEY

Postphlebitic Sequelae Alton Oschner and Michael Debakey, *J A M A*, 1949, 139 423

Postphlebitic sequelae are daily encountered pathologic processes of the venous and lymph systems This problem should be of interest to every doctor and is so emphasized by Drs Oschner and Debakey in this article They have again defined thrombophlebitis and phlebothrombosis and state that the prompt recognition and the institution of adequate therapy early in the course of the disease process are of importance in both types of venous thrombosis Not only can the process be stopped and resolution obtained in a relatively short period of time, but the undesirable sequelae which may produce death or cause chronic invalidism can be prevented

Death is the result of embolism usually in phlebothrombosis but also from smaller emboli in suppurative thrombophlebitis The treatment is proximal ligation Pulmonary embolus requires intravenous papaverine and atropine, cervico-dorsal sympathetic blocks, nasal oxygen and anticoagulants The septic infarct must be further treated by antobiotics and occasionally abscess of lung necessitates drainage

Coagulation thrombus is a soft clot that develops proximal to thrombophlebitis resulting from inadequate therapy during acute stage of thrombophlebitis and may cause pulmonary infarcts The principal sequelae are edema, ulceration and recurrent streptococcic infection Edema is the most frequently encountered and is due to (1) persistent vasospasm, (2) increased venous pressure due to incompetence of the valves of the deep veins and retrograde blood from them decidedly increasing the filtration pressure and (3) pronounced perivenous cicatrization, producing interference with the return flow of blood through the deep venous system If vasospasm is present, measures to produce vasodilatation usually result in complete recovery In the absence of vasospasm complete phlebographic studies to determine potency of deep veins must be done If the deep veins are potent then there is usually an incompetence of the valves and ligation of the superficial femoral and subfacial ligation of the communicating veins in the leg will benefit the edema and ulceration of lower leg A perivenous cicatrix is usually present in an absence of filling of the deep veins and is treated by "unbridling" of constricted vessel by removal of this scar

Recurrent streptococci infection occurs as a result of persistent edema and introduction of streptococci into the area The treatment is prophylaxis Edema is prevent by elastic bandages and control of fungus infection of the feet is accomplished by sympathectomy to promote ankylosis Once streptococcal infection has occurred sulfonamides are given three to four gm daily for a week out of each month for several months

Emil J C Hillenbrand

The Surgical Aspect of Meckel's Diverticulum. John K Owen and George Finney, *So Med J*, 1949, 42 98

Owen and Finney present a comprehensive study of 143 cases of Meckel's diverticulum, intraabdominal Hernia of Meckel's diverticulum is not discussed

The difficulties of diagnosis are stressed and the fact that the condition carries a higher mortality rate than does the appendicitis operation When the condition of the appendix does not account for the symptoms, one should look for a Meckel's diverticulum. Twenty-five patients in this series had had one to th[illegible] is laparotomies that did not relieve the symptoms. A preoperative diagnosis is rare but abdominal pain with bloody stool should make one suspicious. The disease is most frequent in patients between the ages of 11 and 20 years of age.

Leigh F. Watson

Results of Treatment of Carcinoma of the Ovary with Data on the Age Incidence of this Disease. Joseph H. Marks and Martin H. Wittinborg, *Surg., Gynec. & Obst.*, 1948, 87:541.

A review of the literature of malignant epithelial tumors of the ovary leaves some doubt as to the value of roentgen therapy in this disease. The disease is of an insidious nature (in most hospitals the operability rate is less than 40 percent and the rate of cure is distressingly low.

Pemberton in 1940 believed that the operation should be as radical as circumstances would permit and should be followed by x-ray treatment. The authors disagree to some extent with Meigs' who thinks that x-ray therapy "has never cured patients, but it has helped to make them live longer."

Their conclusions were that x-ray therapy should be employed in all cases of carcinoma of the ovary, that it is excellent insurance postoperatively even when the surgeon believes that all disease has been removed. They feel the surgeon should not take too great a risk in his attempt to remove the last fragments of diseased tissue, but institute x-ray therapy inasmuch as operative x-ray therapy may bring about gratifying palliation even when cure is not obtained. It often gives relief of pain and causes a retardation of the production of peritoneal and pleural fluids.

Walter, Backman and Harris in 1941 reviewed the literature up to that time and reported a series of cases from Mount Sinai hospital, New York, of 63 cases of all stages of the disease in which surgery was the only form of treatment. Twenty-four percent were alive at the end of one year and only 6.3 percent at the end of five years. Of thirty-one patients treated by means of surgery followed by adequate roentgen therapy, 87 percent were alive at one year and 29 percent at five years.

Other authors reported series of 100 or more cases with five year survival rates which vary from about 15 to 35 percent. The highest survival rate appears to be that of Lynch who reported 35.5 percent in a group of 62 proved cases alive and well at five years.

Age incidence of cancer of the ovary indicates that the majority of the patients are in their sixth decade. Those under 30 years of age are approximately the same number as of those under 70 years. The age specific incidence of cancer of the ovary is unlike that of most other types of malignant epithelial tumors since it falls after the sixth decade.

Gilbert F. Douglas

Bladder Tumors. James C. Sargent, *Wis. Med. J.*, 1948, 47:1166.

Mainly intended for the general practitioner, this article brings forth certain important features which in the majority of cases agree with generally accepted concepts of bladder tumor pathology and treatment. It is believed that cystoscopy should be done while the patient is bleeding and examination must determine the degree of malignancy. Biopsy material should be taken from the base of the growth as otherwise the diagnosis may be misleading. It is advisable to determine the condition of the upper urinary tract as well as whether or not there is a neoplasm or metastasis present.

It is contended that a tumor in the bladder vault should be treated by partial cystectomy and big infiltrative tumors which are palpable rectally by total cystectomy. Owing to the advances in anesthesia, to the use of blood transfusions and antibiotics, this operation should not be regarded as a prohibitive procedure. For the majority of tumors that have not infiltrated too deeply into the bladder wall especially those situated in the base or lateral walls, the author warmly recommends endoscopic resection with thorough destruction both in breadth and in depth of all of the bladder wall harbouring cancer cells.

J. Bitschai

In Memoriam

AUGUST BIER, M.D.

1862-1949

The Chair of the Department of Surgery, University of Berlin, of the former Royal Surgical Clinic, in the past held an enviable reputation as a center of surgical progress. For over a hundred years it enjoyed the reflected glory of Dieffenbach, von Langenbeck, von Bergmann and others. The fame of these men extended far beyond the frontiers of their own country. The last in this line was August Bier. From 1908 to 1932, during which time the clinic bore his illustrious name, he, like his predecessors, augmented and further extended its traditional reputation.

Shortly after the discovery of general anesthesia, Dieffenbach extolled the new miracle as follows: "A dream has come true. Pain has been conquered!"

Some fifty years later, Bier gave this truth a new impetus through the introduction of spinal anesthesia. As a young assistant in Kiel, he argued that the diagnostic lumbar puncture of Quincke might suggest other possibilities. He was right. Subarachnoid block was born of Bier's idea.

Recently, in a New York hospital, the fiftieth anniversary of this discovery was celebrated, and the heroic experiment which Bier tried on himself was not forgotten. In those days, when only cocaine, a very high toxic agent, was available, Bier became ill with symptoms of intoxication following his autoexperiment. Only when nontoxic substitutes, such as novocaine, became known did the triumph of spinal anesthesia become secure.

Bier was a man of intuition, quick decision and the courage of his convictions. He was a surgeon of towering stature. While there may have been those who excelled him in technical brilliancy in one or the other fields of special surgical endeavor, he was the leader in surgery in his country. His name leads the authoritative work on operative surgery of Bier, Braun and Kummel. During the period when surgeons were limited to classic operations on the extremities, and when the surgical possibilities of the peritoneal cavity and the thoracic cavity were yet to be explored, Bier was pioneering in these fields. He was a master general surgeon.

Bier was firmly opposed to so called "exploratory laparotomies" and blind decompressions of the skull. He was equally opposed to over specialization, although he encouraged special technics. He surrounded himself with those expertly trained in certain fields, but he decried specialization which does not take into consideration the body as a whole.

The First World War yielded a variety of vascular injuries which, in times of peace, had played a minor role. With ardent zeal, Bier threw himself into this new field, which had long attracted him. The principle of suturing vessels had been discovered a short time before. Now he could test it on a grand scale. With pleasure I recall the many occasions on which I was privileged to assist him at operations for aneurysms. I believe these operations marked the peak of his surgical prowess.

Bier was a bold and rapid operator, with a quick recognition and evaluation of the pathologic problem at hand. He found lines of cleavage between matted structures with uncanny certainty. He paid little attention to elaborate draping of the field of operation and was unimpressed with trivial technicalities and an elaborate armamentarium. His technical execution was rapid and, withal, meticulous.

There was another side to August Bier. He studied the natural resources and the recuperative power of the tissues. In this he was influenced by the great biologists and by the philosophy of Goethe. He was particularly eager to establish the physical basis from which this power sprang.

As a pupil of Esmarch, the inventor of the elastic tourniquet, the phenomenon of reactive hyperemia had impressed him. In his early work on collateral circulation, he proved that the hemodynamic forces of Harvey's circulatory theory could not explain these phenomena. However, he drew attention to the automatic circulatory regulation of the actively dilated capillaries, and demonstrated the formation of collateral circulation, independent of the general circulation, when the oxygen requirement of the starving tissue had to be satisfied.

A later development justified his views. *Krogh*, in Copenhagen, demonstrated in a commanding series of experiments that in the kidney only part of the capillaries are active, depending upon the functional requirements, while the other part rests as a reserve, and consequently, the vessels contract and dilate independently of the blood pressure. This discovery was nothing but a confirmation of Bier's fundamental idea. And Krogh received the Nobel Prize!

Bier did not stop at the theory. "Does not hyperemia eventuate immediately after any tissue damage?" he asked. "Is not hyperemia the dominating sign of inflammation? Is not inflammation a curative reaction rather than a mere sign which, too frequently and wrongly, is counteracted by misdirected therapy?" Bier insisted that one must not obstruct the curative blood stream but rather encourage the blood to flow to the areas where nature's efforts are insufficient. This can be accomplished as heat increases the arterial flow and congestion causes a plethora of venous blood. In Bier's *opinion many of the old lay remedies, handed down* from generation to generation, acted in the same manner; however, their effect was interpreted differently. Bier's employment of hyperemia to cure tuberculosis of the bones and joints was based upon the same principle. Thus, he became a precursor of the treatment of tuberculosis with fresh air and heliotherapy.

In his illuminating work, "Hyperemia as a Remedy" he set forth his original ideas on artificial blood supply. The work created a great deal of discussion, and, although it contains some debatable points, it is a stimulating study.

From his early days, Bier had a strong aversion to mutilating procedures as a means of cure. After World War I a new impetus was created in this direction. His approach to the subject is well known. He posed the following queries: To what degree can one rely upon the regenerative forces of man? What conditions are most auspicious, and what should the surgeon do to avoid disturbing these conditions? What are the detrimental and favorable factors for accomplishing a desired end? What should the surgeon do to combat infection? He then postulated the following requirements: complete rest, constant warmth, the prevention of desiccation, the avoidance of introduction of unnecessary foreign bodies into the wound, and the placing of the patient in proper surroundings. These recommendations have proved their value in the treatment of chronic osteomyelitis. Bier did not follow the old methods of procedure. After removing the sequestrum and chiseling the affected bone out to a hollow trough, he neither packed the wound nor left it open. Instead, he *pulled the skin margins together over the wound* with lace bandage, closed the wound watertight, and immobilized the entire limb in a cast for many weeks, without touching the wound in the meantime. This method was the precursor of Orr's treatment of osteomyelitis.

Only those who were privileged to work with Bier understood his versatility. He was an inspiring teacher; on the podium he was a magnet and kept his listeners fascinated, enlivening even the dryest subject. In his dissertations he made use of Hippocratic views, combining them with present-day conceptions.

He had the gift of simplification. His epigrammatic sentences, often humorously revealing the core of things, left an indelible impression.

Bier loved men of wide horizons. One of his favorite medical figures was John Hunter, the great British surgeon. He referred to him as a "surgeon and an anatomist, an experimenter, zoologist, soldier and hunter—in short, a 'swell guy.'" This description fitted Bier as well.

In later years Bier delved deeper into philosophy, occupying his mind with questions of biology. Natural philosophy gained power over him. He no longer followed the orthodox path of science, but became lost in the thickest of speculative thought. Shortly after his seventieth birthday he retired to his country estate, to the trees which he had cultivated throughout his life with the knowledge and passion of a second profession. Perhaps his intentions as a physician can be summarized symbolically from this angle. "He tried to graft the Tree of Knowledge with a shoot from the Tree of Life."

Arthur Israel, F.I.C.S.

FELIX d'HERELLE, M. D.

1873-1949

The death of Felix d'Herelle on February 22 bereft medical science of one of its most distinguished exponents Born in Montreal in 1873, d'Herelle received his classical education in Paris but returned to Canada to obtain his medical degree at the University of Montreal. His actual scientific career began in Guatemala, where he served as professor of bacteriology from 1901 to 1907 In the following two years, as a bacteriologist in the service of the Mexican Government, he isolated the pathogenic microbe that bears his name (Coccobacillus acridiorum de d'Herelle). This led indirectly to his greatest discovery, the parasitic bacterium known as the bacteriophage Pursuing his studies of this phenomenon at the Pasteur Institute in Paris, he established the existence of the bacteriophage in the convalescent human being and conceived the idea that it might provide a biologic process of natural cure for disease Experiments on himself and on members of his family demonstrated both the harmlessness of the bacteriophage itself and its efficacy in eradicating pathogenic organisms in the human body.

In 1922 and 1923, d'Herelle was professor extraordinary at Leyden University (Holland) and from 1924 to 1926 a member of the Conseil Sanitaire Maritime et Quarantenaire of Egypt, where he headed the bacteriologic department of the International Council. In India, under the sponsorship of the British Government, he was spectacularly successful in quelling epidemic cholera by means of bacteriophage therapy. He explained that the bacteriophage is itself "contagious" and therefore can be deliberately employed to arrest an infectious pathologic process and check the spread of epidemic disease

From 1934 to 1936, d'Herelle was entrusted by the Soviet Government with the foundation of "bacteriophage institutes" in Tiflis, Kiev and Kharkov. As a result of his work the Russians made extensive and intensive use of the bacteriophage in the treatment of war wounds and in prophylactic measures against cholera, dysentery and plague

Disease in man, rather than experimental disease in laboratory animals, was d'Herelle's chief interest. He spoke of cholera as "my favorite malady." He traveled indefatigably all over the globe in search of pertinent information He published many articles and monographs, including *Le Bacteriophage, son role dans l'immunite* (Paris, 1921), *Les Defenses de l'Organisme* (Paris, 1923), and *Le Bacteriophage et ses applications therapeutiques* (Paris, 1933) A paper in English, *The Bacteriophage and Its Clinical Applications*, appeared in the United States in 1930. Later (Paris, 1938), he brought together all this accumulated knowledge in a work of monumental importance, *Le Phenomene de la guerison dans les maladies infectieuses*, which has become a classic.

Felix d'Herelle received world wide recognition and many citations and awards of the highest honor, among them the Medaille Decennale de Loewenhoeck, awarded by the Academy of Sciences at Amsterdam for the most important bacteriologic discovery of the decade, and the Medaille Commemorative de l'Institute Pasteur of Paris. He held honorary degrees from the University of Leyden, Yale University, the Universities of Quebec and Montreal, and the Universities of Tiflis and Bakou He was an honorary member of many distinguished scientific colleges and organizations.

Throughout his career, d'Herelle distinguished himself no less by his personal qualities than by his signal achievements. He was perpetually a student, genuinely dedicated to the cause of science. An experimental logic that seemed never to fail him was his guide in everything he did. He made no miserly concealment of his discoveries, however important, but shared them freely and fairly with his colleagues. Toward his opponents—and he had many—he remained open-minded and pacific. He gave great and constant encouragement to younger men, and his appreciation of their talents and accomplishments is made evident by his frequent published mention of his pupils' names and achievements. The lucidity and authority of his mind were unbroken to the end. He died as he had lived, still studying, still experimenting; his theory of bacteriophagic cure prolonged his own life and might have saved it had not his organic tissues been weakened past repair by two successive and severe operations.

It is with a deep sense of catastrophe that we record the death of this great man and extend all possible sympathy to his bereaved family. His life was a long one, as human lives go, but science can ill spare such an apostle, or humanity such a humanitarian, as Felix d'Herelle had proved himself to be.

FRED FRANKLIN ATTIX

M.D., F.A.C.S., F.I.C.S.

On Feb. 9, 1948, The International College of Surgeons lost one of its most devoted members in the death of Dr. Fred Franklin Attix, age 70. Dr. Attix, born in Richwood, Minn., received his M.D. from the University of Pennsylvania in 1900. In 1901 he became a charter member of the Fergus County Medical Society. He later became affiliated with the following organizations: Montana State Medical Association, Western Surgical Association, American Association for the Surgery of Trauma, American College of Surgeons, and the American Board of Surgery. An outstanding achievement in Dr. Attix's life was the founding of the Attix Clinic in Lewistown, Mont.

WILLIAM WALTER REICH

M.D., F.I.C.S.

Dr. William Walter Reich of Berkeley, Calif., died recently at the age of 49. Dr. Reich was born in Independence, Mo., and had his academic training at the University of the Philippines. He served his internship at the University of California, and received his M.D., in 1929 at Stanford University. Dr. Reich was a member of the Alameda County Medical Society, and the California State Medical Society.

CHARLES EDWARD FUTCH

M.D., F.A.C.S., F.I.C.S.

The field of otorhinolaryngology lost one of its prominent contributors in the death of Dr. Charles Edward Futch, of Los Angeles. Dr. Futch graduated medical school at the University of Michigan in 1921, and took postgraduate studies in the anatomy of the ear, at the New York Eye and Ear Infirmary. He served his hospital internship at the City hospital, Cleveland from 1923 to 1924, and was a resident in neuropsy at the Worcester State hospital, Mass., 1924. He later became associate professor at the College of Medical Evangelists in Los Angeles. The American Medical Association, California Medical Association, Los Angeles County Medical Association, Los Angeles County Society of Ophthalmology and Otolaryngology and the Pacific Coast Society of Ophthalmology and Otolaryngology, are but a few of the organizations to which Dr. Futch contributed his fellowship and experience.

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Original Articles

Gastric and Duodenal Ulcers and Their Complications

Treatment by Extensive Resection

H FINSTERER, M D, F I C S
VIENNA, AUSTRIA

UP TO 30 years ago *gastro enterostomy* (G E) was considered the method of choice in surgical treatment of the duodenal as well as of the gastric ulcer, although sleeve resection was demanded for the gastric ulcer by Riedel and then by Payr because of the uncertainty of the diagnosis if there still was an ulcer or already a carcinoma For the duodenal ulcer Kuttner recommended in 1913 the *unilateral exclusion of the pylorus* according to v Eiselsberg as the best method of treatment During World War I, Clairmont Haberer and I began with *the resection of the duodenal ulcer*, whereas the internists Schur and Plaschkes had suggested one year previously the antrum resection for gastric ulcers owing to experimental tests which they had performed

In the beginning Clairmont and Haberer resected only the pylorus and a small part of the antrum in cases of duodenal ulcer Schur and Plaschkes had suggested *antrum resection*, that is resection of the distal third of the stomach, which is the vehicle of hydrochloric acid production in the fundus

In 1918, I had suggested, for the treatment of the duodenal ulcer, the resection in all cases not only of the duodenum with the ulcer but in addition, *at least half, or up to two thirds of the stomach* in order to *reduce* the acid producing mucous surface and to lessen hyperacidity Postoperative survey of those cases by the medical specialist Zweig showed in all cases complete anacidity, which at that time I considered absolutely detrimental Therefore I performed in 1919 and 1920 the *antrum resection* according to Schur and Plaschkes Two years later I reverted to extensive stomach resection because two patients had to be treated for ulcers which were clinically attested by hemorrhage and pains

My suggestion to perform the two thirds resection was rejected by Schmieden in 1920 because of the resection of too much normal stomach tissue, which he considered unnecessary *Antrum resection* according to Schur and Plaschkes (which is resection of the distal third of the stomach) was considered to be the *only justified operative method*. Hohlbaum, who was a pupil of Payr, had also rejected my wide gastric resection at the Naturforscher Versammlung in Leipzig in 1922 and that *removal of half of the stomach* and even of the antrum was completely *sufficient* in case the mucosa had been previously extirpated in the excluded remaining antrum. It is undoubtedly to his credit to have proved by experimental work the necessity of excision of the mucous membrane, which I had already mentioned in 1918 but which I did not think absolutely necessary, as permanent results showed no difference with or without mucous membrane excision.

Unfortunately Fromme's proposal was put into practice, because in the course of the past years I had to operate in several cases of jejunal ulcer where other surgeons had performed the resection for exclusion according to Fromme's proposal. The mucosa was lacking in the excluded antrum, but a large peptic jejunal ulcer had resulted, in one case even combined with a gastrocolic fistula. As many cases of gastrojejunal ulcer after resection of an ulcer prove, the half-stomach resection is not even sufficient in case of a duodenal ulcer resection, the stomach being rarely dilated to a large extent in such cases. To an even lesser degree can one expect the nonoccurrence of a peptic jejunal ulcer in cases of a resection for exclusion with its limited extent.

The two-thirds up to four-fifths resection is objected to because of *a high mortality rate* following this operation. The mortality does not depend on the extent of the stomach resection, but rather on the location and on the size of the ulcer to be removed. The mortality is higher in penetrating duodenal ulcers as compared with nonpenetrating duodenal ulcers. A higher mortality rate is also to be expected in ulcers penetrating near the cardia than in the antrum—or *pars media-ulcers,* which are not penetrating. In the latter group a large enough duodenum and a moderately advanced age of the patient allow a B I anastomosis. The deaths which occur owing to an insufficiency of the duodenal closing at the modified method of B II have nothing to do with the extent of the resection. They depend only on the method of duodenal closure.

With all gastric ulcers, and in cases of a nonpenetrating duodenal ulcer, the simplest, surest and quickest *method of closing the duodenum* is the following: Ligature of the duodenum, a pursestring suture 1 cm. distally, severance of the duodenum proximally of the ligature, invagination of the stump, the knotting of the pursestring suture and on top of this two Lembert sutures; covering of the stump with the remnants of the gastrocolic ligament. In cases of a duodenal ulcer *penetrating* into the pancreas I have closed the opening first by interrupted sutures after having loosened the posterior wall of the duodenum from the pancreas. Then I made another row of interrupted sutures on it and finally covered the suture area with the pancreas capsule. Unfortunately some cases proved insufficiently closed and developed a duodenal fistula and a consecutive fatal peritonitis.

For more than 15 years I have been closing the duodenum, which is detached distal to the ulcer bottom one-half to 1 cm. away from the pancreas. Also this was done in such cases with a constricting pursestring suture; then I applied another pursestring suture distal to it, which is knotted after invaginating the remaining stump. On this, two Lembert sutures are superimposed. The duodenal closing with pursestring sutures will be absolutely reliable if the mucous membrane is not included in the Lembert suture. It remains tight even in cases where an obstacle to drainage in the afferent anastomotic loop brings about an enormous overdilatation of the duodenum owing to a biliary and pancreatic engorgement, thus possibly resulting in *death by way of duodenal reflex.*

My first experience of this kind was in *1916* in a case of total gastrectomy for carcinoma. Of late I have also seen this happen after resection of a duodenal ulcer. In such cases as were published in detail by Hartmann, *Wiener klinische Wochenschrift,* 1948, it would have saved the patient's life if the duodenal closing had been shattered and if the secretion had been allowed to run out of the abdomen through a drainage tube. In penetrating duodenal ulcers, where the bottom of the ulcer in the pancreas is narrower than the breadth of the duodenum, and if the peritoneal covering of the pancreas is thick enough to ensure a holding fast of the suture, then I performed the *closing of the duodenum according to* Bsteh.

Technic: The duodenum is loosened from the ulcer bottom and the anterior wall is severed near the pylorus, whereas the posterior wall remains in connection with the distal margin of the ulcer bottom The anterior wall is invaginated into the duodenum and sutured to the proximal ulcer margin so that the interrupted silk suture grasps the ulcer margin and then the anterior wall of the duodenum about an inch distal to the severance spot, and finally it is knotted By this technic the anterior wall is permanently invaginated and lies in close touch with the posterior wall, thus closing the duodenum in a valvelike fashion in case an obstacle to drainage should result in biliary or pancreatic engorgement in the duodenum

This valve mechanism distinguishes the above method (that of Bsteh) from the Nissen closure method

In this latter method the margin of the anterior duodenal wall is sutured to the distal margin, in a second row of stitches the proximal ulcer margin is sutured to the anterior wall 1 2 cm distally, thus bringing about a complete closing of the ulcer bottom On accumulation of secretions on the ground of the ulcer, the first row of sutures is either shattered so that the secretions flow into the duodenum or else the second row will loosen and the secretions will flow outward, entailing a diffuse peritonitis in case the abdomen is not being drained A drainage tube would mean the creation of a duodenal fistula—a most propitious outcome

The duodenal closing advocated by Bsteh has another advantage over the closing of the duodenum with two pursestring sutures because the secretions of the pancreas will flow into the duodenum in cases of a deeply penetrating ulcer bottom where the accessory pancreatic duct may be eroded, whereas in closing the duodenum with two pursestring sutures the pancreatic secretion has to be eliminated from the abdomen through the rubber tubes In cases of the accessory pancreatic duct being the only excreting duct (the main duct being obliterated), the closing with two pursestring sutures is followed by a *complete pancreatic fistula* with the pancreatic gland secretions flowing outward

Seventeen years ago I experienced this with a 35 year old farmer Profuse pancreatic secretions were excreted right from the first day after the operation which had actually been performed on Dec 16 1930 and had consisted of the resection of a large duodenal ulcer which had penetrated into the pancreas and into the liver There was no bile mixed in this secretion (600 to 1200 cc daily) Four weeks later I had to proceed to a jejunostomy owing to progressive cachexia By uniting the drainage tube of the jejunostomy with the tube of the pancreatic fistula by a piece of glass tube I was able to divert all of the pancreatic secretions into the jejunum, thus bringing to an end the fat stools and obtaining a quick recovery of the patient

After another eight weeks the patient was subjected to another laparotomy The fistula canal, which had reached right up to the pancreas, was isolated and implanted into the duodenal stump, bringing about quick recovery The jejunostomy closed after removal of the drainage tube The patient gained weight quickly He was able to do normal work and two years later was cured This case was published extensively in the *Schweizerische Mediz Wochenschrift*, No 2, 1935

A reliable closing of the duodenum is of special need in cases where the resection involves only the removal of the antrum and where an anastomosis according to Kronlein-Mikulicz, side to side with a long jejunal loop is performed Or it is necessary if one uses the Reichel Polya method, taking the entire breadth of the stomach for the end to side anastomosis In the upright position the anastomosis turns around so that the afferent and the efferent jejunal loops are on equal level thus bringing about a retrograde filling of the duodenum A duodenal closing which is not absolutely reliable may be shattered

In other cases such troubles will occur postoperatively and a second laparotomy and an *entero anastomosis* (E A) may prove necessary That is why Reichel suggested in 1921 that E A be performed in all cases operated upon according to this method, between the afferent and efferent loop I consider this dangerous because it actually favors the origin of a peptic jejunal ulcer, the reason being that the contents of the stomach (which are acid because of the less extensive resection and entering in the jejunum) cannot be neutralized by the bile which flows through the entero anastomosis

After the resection of an *ulcer penetrating*

TABLE 3

Mortality of uncomplicated ulcer resections performed Aug. 1, 1935-Dec. 31, 1947 at the Allgemeines Krankenhaus.

Method of anastomosis	Gastric ulcer		Duodenal ulcer		Gastric and duodenal ulcer		Total	
	No.	Mortality	No.	Mortality	No.	Mortality	No.	Mortality
Modified B II (Hofmeister-Finsterer)	1064	46=4.3%	2608	105=4.0%	254	10=3.9%	3926	161=4.1%
Billroth I	317	14=4.4%	139	1=0.7%	14	....	470	15=3.2%
Haberer's modification	24	....	95	4-4.2%	7	....	126	4=3.1%
Total	1405	60=4.3%	2842	110=3.8%	275	10=3.5%	4522	180=3.9%

43-year-old, rather cachectic woman according to B I despite my continuous statements that B I is absolutely contraindicated for patients over 60 years of age and for completely emaciated patients, the adhesion capacity of the serous membranes being not strong enough when the sutures cut through on the fifth to seventh day. This is due to an incomplete power of regeneration of the tissues. The normal contractions of the stomach that is shortened by the B I method and at the same time put in between the cardia and the fixed descendant part of the duodenum may involve an opening of the anastomosis after severance of the sutures. This danger does not exist with the modified B II method, the afferent loop beeing freely movable so that the normal contractions of the stomach do not tear on the anastomosis.

The second death was that of a 50-year-old man, who had a heart lesion of old standing (operated Dec. 23, 1923). Death occurred (as proven by autopsy) through an *embolism of the superior mesenteric artery*. Twelve days later consecutive *gangrene of the small intestine* resulted. The third death was that of a 69-year-old woman (operated Jan. 29, 1934). She was cholecystectomized and had a tumor in the antrum, which was suspected of being a carcinoma and had been resected. A B I was performed despite her age, the entire great omentum having been adherent in the pelvis owing to a previous gynecological operation. She had to be reoperated on eight days later owing to vomiting caused by stenosis. A fibroplastic peritonitis in the anastomosis spot was to be seen, whereas the anastomosis was patent for one finger breadth. Following an anterior G. E. with E. A. and jejunostomy, the vomiting continued but was improved by gastric lavage. Three weeks later death occurred owing to *pneumonia* (no postmortem).

On my ward, mortality due to B I operations is lower (470 cases with 15 deaths—3.2 percent) than with the modified B II method. The reason is that B I cases were uncomplicated ones; above all, there were no penetrating ulcers. The smaller extent of removed stomach tissue had nothing to do with the better results. The main reason was the fact that with patients over 60 years of age or with rather emaciated ones, the B I anastomosis has never been used, but rather the H. F. method.

The *terminolateral gastroduodenostomy*, according to v. Haberer, shows a slightly higher mortality rate (181 cases with nine deaths—4.9 percent). Out of these nine deaths, only four are connected with the kind of anastomosis but not with the extent of the resected part. They could have been avoided by using the H. F. anastomosis method. The wrong indication omitted drainage in a case where the duodenal ulcer had penetrated into the pancreas; an end-to-side anastomosis was performed between the gastric stump and the duodenum, or drainage had been omitted only because of the terminolateral anastomosis in a cholecystectomy case

The reason for the mediocre results obtained by the H F resection method is the fact that in old and emaciated patients exclusively, the method of Hofmeister Finsterer and *never* the B I is used, and that in cases of large pancreatic penetrating ulcers this resection was also applied even when the resection for exclusion would have been the safer method

The mortality rate in connection with the resection for exclusion (Table 4) does not depend on the extent of the resected stomach but mainly on whether or not the pylorus has been removed and how the duodenal closing has been performed in case of removal of the pylorus Patients operated upon in different private hospitals since 1916 show, among 119 resections for exclusion with remaining pylorus five deaths—4 2 percent

CASE REPORTS

A 44 year old man (operated on June 28, 1919) showed a *perforation* of the remaining ulcer two days after operation This was recognized too late and therefore the operation was useless A 40 year old man (operated on May 1931) died of *postoperative bleeding* in spite of three blood transfusions, probably owing to the ulcer which had been left in situ Two patients died of *peritonitis* caused, in the case of a 44 year old woman, by the fact that during the operation profuse stomach contents found their way into the abdominal cavity out of a heavily dilated and not emptied stomach A 62 year old man whom I had operated on at the St Michele Hospital, Paris, in May 1933 showed *peritonitis* due to an *insufficiency* of the antrum closing *suture* The mucosa of the antrum had been excised and no drainage had been applied Careful draining would have averted this mortal outcome, which occurred through a partial necrosis of the excluded antrum The fifth case mentioned above died of *pneumonia* 18 days after the operation

The mortality rate is of 13 7 percent (51 cases with seven deaths) at the *resection for exclusion with removal of the pylorus* and closing of the duodenum proximally to the remaining ulcer The pylorus was only removed in cases where the superior horizontal part of the duodenum was not affected and where the ulcer was located toward the outward margin near the papilla of Vater

In the first years, after having removed the pylorus, I have closed the duodenum by interrupted sutures or by a continuous suture On this I applied a row of seromuscular stitch sutures, then I covered the suture field with the pancreatic capsule and closed the abdomen without draining By doing so I encountered three deaths through peritonitis or rather through accumulation of duodenal contents subphrenically after the duodenal closing had opened Since 1930, I remove the pylorus only in cases where at least 2 cm of the duodenum are not affected ahead of the ulcer It enables me to close the duodenum opening by a constricting pursestring suture

TABLE 4

Mortality with resection for exclusion

Operations performed	Resection for exclusion without pylorectomy		Resection for exclusion with pylorectomy	
	Number	Mortality	Number	Mortality
1916-1919	22	1=4 5%	12	2=18 6%
1920-1929	65	1=1 5%	26	3=11 5%
1930-1947	32	3=9 3%	13	2=15 3%
Total	119	5=4 2%	51	7=13 7%

after having severed the duodenum closely behind the pylorus. Distally I apply another pursestring suture. Now the closure holds absolutely fast, and I have not met with another insufficiency of the duodenal closing since.

Of two fatalities which happened since 1930, one was due to *uremia* with hypertrophy of the prostate gland and to nephritis in a 60-year-old man. A 49-year-old man who was reoperated on the fourth day because of *peritonitis* showed a perforation of a retroperitoneally located pus formation below the cecum. The postmortem showed perforation of the excluded ulcer which was covered by the gastrocolic ligament, the duodenal contents extending retroperitoneally. The duodenum closing was holding.

Resection of ulcers located near the cardia shows a higher mortality than does resection of any other variety gastric ulcers. In 1939 Rieder compiled the cases of ulcer which were published up to 1938. He found that in 114 cases with a curved resection, there were 16 deaths (11.4 percent mortality) and 120 cases operated upon according to the Kelling-Madlener method resulted in two deaths (1.7 percent mortality).

In my own material, mortality is higher, as shown in Table 5 (614 resections with 48 deaths—7.8 percent), than in the other resections for ulcers. The curved and the subtotal resection with a Hofmeister-Finsterer anastomosis showed the highest mortality. It must be stated, however, that out of the four deaths which occurred at the Garnisonspital No. 2 and in private hospitals, two deaths were due not to the resection but rather to poor postoperative treatment.

CASE REPORTS

A 29-year-old soldier on whom I had performed, in 1918, a curved resection with a H.F. anastomosis because of a lesser curvature ulcer extending from the pylorus right up to the cardia and penetrating into the left lobe of the liver, died two months later of *chronic septicemia* originating from a left-sided *empyema* of the pleural cavity. My successor at the military hospital had treated this empyema, despite my objection, by repeated paracentesis only, and not with rib resection and drainage.

A 67-year-old man, who had received x-ray treatment for his cardia carcinoma at Prof Holzknecht's Röntgen Institute 1918, was admitted in 1922 to the Hospital of the Brothers of Charity for dysphagia. At operation (which was carried out with splanchnic anesthesia) I found an ulcer near the cardia which had penetrated into the pancreas. The cardia was hypertrophic, and there was a second ulcer in the duodenum. Curved resection, (H.F. anastomosis) followed, and the postoperative progress was uneventful. One week

TABLE 5

Operation for gastric ulcers near the cardia.

	Military and private hospitals		Allgemeines Krankenhaus		Total	
	No.	Mortality	No.	Mortality	No.	Mortality
Curved resection, modified B II (Hofmeister-Finsterer)	59	4=6.7%	367	40=10.9%	426	44=10.3%
Curved resection, Billroth I	23	....	86	....	109	....
Madlener operation with modified B II (Hofmeister-Finsterer)	7	....	25	1=4.0%	32	1=3.1%
Madlener operation with Billroth I	3	....	44	3=6.8%	47	3=6.4%
Total	92	4=4.3%	522	44=8.4%	614	48=7.8%

after the operation the patient was able to swallow solid food Two weeks later there was a sudden onset—dysphagia occurred

While I was absent my assistant performed a jejunostomy The patient kept on vomiting all the time after this had been done, and signs of a high located obstruction were evident After my return from a Congress in Leipzig I found the reason for this obstruction A thumb sized drainage tube had been used for the Witzel fistula, and thus the gut was completely closed On the fourth day after this second operation I removed the thick drainage tube and replaced it by a thin one, thus stopping the vomitus at once The patient could swallow anything, even bread, but most of the food came out again beside the drainage tube I tried to close the fistula extraperitoneally but without success Another operation (bilateral intestinal exclusion) was refused by both the patient and his next of kin A progressive emaciation owing to the fistula and finally death occurred due to inanition, seven weeks after the stomach resection

There is no doubt that the first patient could have been cured had the empyema been treated properly In the second case, treatment of the cardiospasm by medical procedures would have sufficed, and by no means was a thumb sized rubber tube instead of a rubber catheter justified for a Witzel fistula The other two deaths, which were due to an esophageal fistula, could have been avoided by an operation according to Kelling Madlener

Excellent results were obtained by the use of the B I method, which, however, was only applied in simple cases as well as in young patients

In cases of acute perforated ulcer where a *primary resection* is indicated, the extensive two thirds resection may well be applied without increasing the mortality rate In private hospitals acute perforations are rarely admitted since they require emergency operations They are rather pushed into public hospitals where they can be operated upon immediately I myself have not operated on many acute perforations in private hospitals In suitable cases (short time limit after perforation, no progressive peritonitis with intestinal paralysis) I *have performed the primary* resection and I have had not death among 20 such cases

On my hospital ward where on duty days the emergency operations are performed mainly by the assistant surgeons, primary resection resulted in four deaths out of 90 *resections (4 4 percent mortality)* These operations have been performed in prognostically good cases with no progressive peritonitis With cases of simple closing of the perforation, the mortality was 25 percent (208 ruptures covered with stitches with 52 deaths) Therefore the typical stomach resection, which spares the patient another operation, seems to be justified in initial cases

In cases of *acute and extensive bleeding from a chronic ulcer* I advised resection of the bleeding ulcer 30 years *ago*, when I suggested operating at the earliest possible date and removing the ulcer at least by way of a wedge shaped *excision*—if possible, however, as *a typical stomach resection* This is the surest way of stopping the bleeding instead of using *gastro enterostomy*, the results of which are rather doubtful because of the hemostatic effect I have emphasized that the *immediate results* of operative treatment (beside the absolutely sure hemostatic effect) are dependent in the first place on *the duration of the bleeding* and on the *degree of the anemia* and that the best results may be obtained with the early operation within 24 to 48 hours after the onset of acute bleeding

In my last publication (*Wiener mediz Wochenschrift*, p 3, 1947), I was able to report that out of all typical resections and early operations carried out in private hospitals up to 1946, two patients had died (only 2 5 percent mortality) In view of the fact that I encountered no other death with further such early resections, I had up to now, out of 83 resections all carried out to a normal extent, a mortality of 2 4 percent (Table 6)

CASE REPORTS

The first death was that of an 80 year old man, on whom I had intended to carry out a G E as an emergency operation He had been suffering with a highly stenotic ulcer for the last 40 years with continuous vomiting and loss of weight (body weight 34 Kg in relation to a normal height) During the night prior to the projected operation there was a severe bleeding On May 29, 1927, the operation was performed with mesenteric anesthesia (one quarter percent novocain solution) and showed about a gallon of bloody liquid, which was

TABLE 6

Gastric resections for acute profusely bleeding ulcers.

	Early operations		Late operations	
	Number	Mortality	Number	Mortality
Military hospital and private hospitals 1916-31.XII.1947...	83	2=2.4%	62 (56	15=24.1% 9=16.0%)
Surgical ward Allgemeines Krankenhaus 1.VIII.1935-31.XII.1947...........	82	4=4.9%	74	16=21.6%
Total......	165	6=3.6%	136 (130	31=22.8% 25=19.2%)

emptied out of a stomach reaching down into the true pelvis, and a typical resection was made because of a large gastric ulcer which had penetrated the pancreas. There was an ideal postoperative course. The pulse rate was 132 prior to and 136 after the operation, on the second day 100, on the third day 80. Healing took place by primary intention. A week later, when the patient was out of bed, he caught pneumonia. Death occurred from *bilateral pneumonia* 10 days after the operation.

Another 48-year-old man, who had been admitted to a private hospital with a nearly impalpable pulse owing to a severe bleeding which had recurred twice within 24 hours and who had had an influenza for the last three weeks, showed at the operation an erosion of the pancreaticoduodenal artery, caused by a duodenal ulcer which had penetrated into the pancreas. After ligature of the squirting artery a typical resection was made. The influenza led the way to a pneumonia on the left side first and then bilateral. Seventeen days later death occurred from *pneumonia*. There was no postmortem.

On the ward the results with early resection are not quite as good (82 resections with four deaths—4.9 percent) but here too mortality is not higher than in the normal resection of an ulcer.

Of the four deaths, two were due to *pneumonia* and one to *peritonitis,* caused by the cutting through of a fixation suture of the mesocolon slit on the anterior wall of the stomach stump. The fourth death was due to an adhesive *ileus* and at the same time there was luetic aortitis.

My early operations were performed in some cases with very *severe* bleeding. There is ample proof for this, as in most cases the hemorrhage started with giddiness, black vision before the eyes or actual fainting fits. In 27 operations the bottom of a large and penetrating ulcer showed an eroded pancreaticoduodenal artery or the left gastric artery, in one case the splenic artery, the middle colic artery in another case. The lumen was closed by a clot at the time of the operation, the removal of which immediately caused severe bleeding. In spite of this only 20 patients needed a blood transfusion, in most cases after the operation had already stopped the bleeding.

The *late operation* results are not so good, in private hospitals or in the hospital ward. Of 136 patients, 31 died (22.8 percent mortality). Deducting six cases which have nothing to do with either the severe anemia caused by repeated hemorrhage or the operation itself (during World War I one patient died of relapsing dysentery, one died of diabetic coma prior to the insulin treatment, one of uremia with prostatic hypertrophy, one of septicemia due to a gangrenous appendicitis which had occurred after the operation and ended fatally despite another operation, and two of peritonitis caused by perforation of a bleeding ulcer), the mortality is still 19.2 percent.

The main reason for death was the severe degeneration of the parenchymatous organs caused by long-standing anemia which could not be made up for by exact hemostasis or by repeated blood transfusions. Only early operation might have prevented it. The results of late operation are even worse for the simple operation than for the resections. Out of seven gastro-enterostomies carried out in the course of the first years, three cases died. Out of 14 cases of G. E. with simultaneous compression of the duodenum by a tampon there were four deaths (28.5 percent). Even simple excision of the ulcer resulted in five deaths out of eight.

The results of the late operation are certainly not satisfactory, but they are much better than the results obtained in those cases, which were fruitlessly treated by *medical procedures* before the operation, if put on further medical treatment only. The *mortality* of the acute hemorrhage *treated by medical procedures* is not from 1-5 percent, as is time and again asserted by internists, if one considers the severe hemorrhage only, not to speak of the slight and often occult bleedings in figuring out the mortality rate.

A report of Chiesman is very important for evaluation of the medical treatment and for comparison with the results achieved by the late operation. He refers to 251 patients with acute hemorrhage caused by ulcers admitted to the St. Thomas hospital (London). *Medical treatment* had a *19 percent mortality.* In 189 cases in which bleeding had stopped on the first day only two patients died (1.05 percent). *Forty-six out of 62 patients died when the bleeding had lasted more than 24 hours or when it had repeated itself quickly. This is a mortality of 71.1.* In 45 cases postmortem showed a major arroded vessel on the ulcer bottom. According to Chiesman this explains the fact that medical procedures, even blood transfusions, could not stop the hemorrhage. He is of the opinion that in cases like these operation is urgent, as mortality would certainly be lowered.

Comparing these results with those achieved by a late operation, one has the obligation to try the late operation at any rate in those cases which are sent to the surgeon because of an imminent death after fruitless medical treatment. At least a few of those otherwise lost patients will thus be saved. The following case shows that a surprising success may still be achieved even with very old patients in bad condition by trying a nearly hopeless operation.

CASE REPORT

An 85-year-old general on whom I had performed a posterior gastro-enterostomy for gastric ulcer 30 years ago, when I was assistant surgeon at Hochenegg's Clinic, had the following history: He had been repeatedly treated for gastric pains, and five years ago he had overcome a severe hemorrhage. In the course of the last year his pains had increased and two weeks prior to the operation he had another *severe hemorrhage* due to a peptic ulcer of the jejunum. This hemorrhage *recurred three times* in spite of medical procedures and several blood transfusions. A *severe anemia* resulted (2,000,000 red blood cells, hemoglobin 38). Because of the pains and progressive weakness the patient asked for the operation. His physicians had dissuaded him previously because of his age. On March 11, 1943, the operation took place after a blood transfusion. Local anesthesia of the abdominal wall was used and mesenteric anesthesia with a one-fourth percent novocain solution only. I found a large gastrojejunal ulcer, penetrating into the mesocolon and the transverse colon and on the point of perforating into the colon. I carried out *resection of the stomach* and of the *jejunal loop,* leaving back the bottom of the ulcer on the mesocolon and on the transverse colon; end-to-end anastomosis of the jejunum, distal to it end-to-side anastomosis according to H.F., one drainage tube, suture of the abdominal wall. Another blood transfusion was given after the operation. With regard to the abdomen, uncomplicated recovery followed. In addition, the patient had suffered severe bronchitis and prostatic pains. Three weeks later the patient was dismissed as cured.

According to my own experience, extensive stomach resection may well be performed with a clear conscience also in case of acute bleeding due to an ulcer. Through this operation the patients are not only cured at once, but may also remain pain-free throughout life. It is necessary, however, to *eliminate deep general anesthesia with ether completely,* and to operate either with local anesthesia of the abdominal wall and with mesenteric anesthesia (one-half percent and in some cases one-fourth percent novocain solution). Patients who have lost a great amount of blood and whose B. P. has dropped below 100 mm. should be spared splanchnic anesthesia because of its blood-depressing effect. In case mesenteric anesthesia does not suffice for complete relief of pain, one may add, with younger patients for short periods, some ether (20-40 ccm. with the open mask). This small amount stimulates the patient and can be used if a short laughing gas anesthesia is not available.

In case of a *radical operation for gastrojejunal ulcers* the two-thirds resection is rendered necessary by the sole fact that the recurrence of the ulcer speaks for a high ulcer diathesis, caused in most cases by considerable hyperacidity, mortality being to a lesser extent dependent on the extent of the resected part than on the location and penetration of the ulcer. However, as I was able to state in my paper at the meeting of the American College of Surgeons, in New York in 1938, mortality is higher in cases of a radical operation for noncomplicated peptic ulcer of the jejunum after a previous resection (34 cases with 8 deaths—23.5 percent mortality) than it is after a radical operation for peptic ulcer of the jejunum following gastroenterostomy. Out of 116 posterior G. E. operations with eight deaths I had a mortaliy of 6.8 percent and with 19 anterior G. E. operations three deaths, a mortality rate of 15.7 percent. In those cases which were complicated by an acute hemorrhage or by a gastrocolic fistula, mortality is very much higher but also not determined by the extent of the resected part. As Table 7 shows, the mortality has not changed essentially up to 1948.

The main *objection against extensive stomach resection* is that the *permanent results are not better* than those obtained with small resections of after G. E. and that peptic ulcer of the jejunum cannot be avoided. Not only does my experience contradict this, but also the publications of other surgeons do. A control examination carried out in 1933 (Table 8), the results of which are published in *Bulletin et Mémoires de la Societé Nationale de Chirurgie* (Paris), showed that out of 244 patients with gastric ulcers which were resected up to 1930, 234 cases *(95.8 percent) are completely free of pains.* They had put on weight up to 30 Kg. They could eat any kind of food and were in perfect working condition. Thus a permanent cure may be spoken of in those 120 patients operated upon 11 to 20 years ago. Ten (4.4 percent) were improved and painfree, but they had to follow a diet in order to prevent heartburn. They too were in a position to work and were well satisfied with the results of the operation. No unhealed lesion was to be found among them.

Of the 508 patients who underwent resection of a duodenal ulcer, 481 (94.6 percent) were completely cured. Patients who had this operation performed in 1919 and 1920 had only the antrum removed, and they in turn had to live by a strict diet; otherwise they were liable to pyrosis and pains, even though they were capable of working.

Seventeen patients (3.3 percent) were uncured. In three cases the antrum resection according to Billroth I was followed by a recurring duodenal ulcer. In four cases of terminolateral gastroduodenostomy, according to Haberer, a recurrence of the ulcer probably developed in the stomach. In 10 cases an anastomosis according to Hofmeister-Finsterer had

TABLE 7

Radical operation for gastrojejunal ulcers.

	Uncomplicated cases		Acute hemorrhage, perforation fistula gastro-jejuno-colica	
	Number	Mortality	Number	Mortality
Hochenegg Clinic and private hospitals 1914-31.XII.1947	200	24=12%	29	8=27.5%
Surgical ward Allgemeines Krankenhaus 1935-31.XII.1947 .	93	11=11.8%	20	12=60.0%
Total	293	35=11.9%	49	20=40.8%

been performed after the resection of half of the dilated stomach or resection of the antrum. Pains of the chronic colitis type, which had existed prior to the operation, returned in four cases. In six cases the clinical diagnosis of peptic ulcer of the jejunum was made. Three of the patients in these six cases had a second operation; two showed a peptic ulcer of the jejunum, and the remaining one case had chronic gastritis

CASE REPORTS

Case 1: A 51-year-old doctor who had suffered with a stenotic duodenal ulcer for the last five years had to undergo a resection of the ulcer with *half of the dilated stomach, May 14, 1917, at* Garrison hospital No. 2, and an end-to-side anastomosis was made. Two years later his complaints recurred as well as his pains, and twice, there were hemorrhages. On Dec. 27, 1924, the patient was admitted for an early operation because of a *severe gastric hemorrhage.* A comparatively large gastric stump as well as two peptic jejunal ulcers on the afferent and efferent loop were to be seen, the intestine being filled with blood. The radical operation comprised the *resection of* 12 *cm. of the lesser curvature* and of 20 cm. of the greater curvature, together with the anastomotic loop. An end-to-end anastomosis of the jejunum was followed by a typical end-to-end anastomosis H.F. The patient's side was cured and he was completely devoid of any pains up to 1938. The patient is living abroad. No further news is available.

Case 2: A 37-year-old soldier, who had undergone a G.E. at the Hochenegg Clinic in 1914 because of a duodenal ulcer, was reoperated upon June 27, 1918 at the Garrison hospital because of a duodenal ulcer. The duodenum with the pylorus and the antrum right up to the G.E. (which was *quite normal) were resected so that an original* Billroth II resulted. Several years elapsed during which the patient had been pain-free, but finally pains returned. On Nov. 29, 1927, a radical operation (because of a peptic ulcer of the jejunum) was performed. A callous ulcer in the efferent loop and a second one in the afferent loop were to be found. Out of the large gastric stump 10 cm. of the lesser and 15 cm. of the greater curvature were resected, the very wide anastomotic loop was closed by a longitudinal suture, and a terminolateral gastro duodenostomy was applied. Radical operation on the extensive ventral hernia followed. After the operation the patient had severe coughing fits and vomited severely, having shattered his abdominal wall sutures. The doctor was called after nine hours by the nurse and found under the dressing the transverse colon as well as several loops of the small intestine hanging right down to the symphysis. After the loops of the cellulose dressing had been cleaned, their reposition in situ was made and the abdominal wall sutured afresh. Twenty-four hours later death occurred from peritonitis

It is interesting to note that the permanent results after the Billroth I operation, in which less stomach tissue was resected, were not so good Of 72 patients only 63 (87.5 percent) were permanently cured, whereas the H.F. method of extensive resection yielded 97 percent of complete cures

The permanent results of this operation as performed since 1933 could not be checked

TABLE 8

Permanent results of ulcer resections performed 1916-1930

	Gastric ulcer		Duodenal ulcer	
	Res. modif B II. (Hofmeister-Finsterer)	Res Billroth I or Haberer modificat	Res. modif B II (Hofmeister-Finsterer)	Res Billroth I or Haberer modificat.
Cured	162=98.7%	72=90%	388=96.3%	93=88.6%
Improved	2= 1.3%	8=10%	5= 1.2%	5= 4.8%
Uncured	111	..	10= 2.5%	7= 6.6%
Total	164	80	403	105

because of the war for it was impossible to get news from all patients, especially from those living abroad. A check-up on patients operated upon since 1935 on the ward is of no practical value; even during the war no reliable answers could have been obtained, because even those completely cured uttered complaints for fear of being declared fit for active service or for civilian duty in ammunition factories in the hinterland. Besides, they received special rations for their alleged complaints. This practice still exists and will exist up to the day when food is no longer rationed.

Based on a large-scale statistical collection of 1930, Starlinger has figured out the *frequency of recurring ulcers after resection* with a B II anastomosis with its modifications as 0.6 percent, and after B I or the Haberer method as 0.9 percent. This statistical collection was not compiled of already published data; it was obtained by sending out a questionnaire to the different surgeons, asking them how many resections they had done and by which method, and how often they had been obliged to reoperate on a relapsing ulcer.

Starlinger did not ask, however, in how many cases an ulcer was found to be existing by clinical evidence—pains, repeated hemorrhages or positive x-rays, and how often other surgeons had to reoperate on a recurrence. These questions could not have been answered in the short survey period of six weeks, but only after an elaborate check-up.

As I had to reoperate in two cases of peptic ulcer of the jejunum out of my performed 6975 ulcer resections, *my frequency would be 0.03 percent* according to Starlinger's calculation scheme. Recurrence of peptic ulcer of the jejunum after resection is certainly higher than is stated in the literature. I drew this conclusion from the fact that in 322 radical operations for peptic jejunal ulcers I had 53 cases of peptic jejunal ulcer following *resection*. Among these were 12 operated upon the first time by Lorenz, who is generally known to have performed only the *antrum resection.*

TABLE 9

Permanent results of resections for exclusion

A) Resection for exclusion without pylorectomy.

	1916-1925	1926-1935	Total
Cured	53=82.8%	25=96.1%	78=86.6%
Improved	2= 3.1%	....	2= 2.2%
Uncured (Ulcus pept. jejuni)	9=14.0% (5= 7.3%)	1= 3.9%	10=11.1% (5= 5.5%)
Total	64	26	90

B) Resection for exclusion with pylorectomy.

	1916-1925	1926-1935	Total
Cured	12=63.1%	15=93.8%	27=77.1%
Improved	3=15.8%	1= 6.2%	4=11.4%
Uncured	4=21.0%	....	4=11.4%
Total	19	16	35

Those 12 cases could not be mentioned in his reply to Starlinger because he did not know the results In 30 other cases a resection had been carried out in connection with the radical operation for peptic jejunal ulcer, the reason for the recurrence having been in most cases too small a resection or a Y shaped anastomosis

The *permanent results after resection for exclusion* (Table 9) were checked at a control examination carried out in 1939, in which the results in only five cases (3 5 percent) remained unknown Out of 90 cases of resection for exclusion, with the *pylorus left* in situ, 78 patients (86 6 percent) were completely cured and pain free Out of these the operation had been carried out in 18 cases 16 to 22 years ago, in 31 cases 11 to 15 years ago, in 22 cases six to 10 years ago, and in seven cases three to five years ago Two patients (2 2 percent) were *improved,* 10 (11 1 percent) considered themselves *not cured,* whereby in five cases only (5 5 percent) a peptic jejunal ulcer could be held responsible as the etiologic factor It seems noteworthy that between 1916 and 1925 only 53 out of 64 patients had been completely free of pain, two having been improved and nine not cured (among whom were five who had peptic jejunal ulcer) From 1926 to 1935, 25 out of 26 patients were rendered free of pain and one sole patient remained uncured

In cases *in which the pylorus had also been removed,* the *permanent* results were, strikingly enough, not so good Out of 35 patients 27 only (77 1 percent) were completely cured and four (11 4 percent) improved and in a working condition, whereas four patients (11 4 percent) considered themselves *uncured* Three of these last four had undergone G E previously in another hospital This operation could not heal the ulcer, which was situated a good way outward in the duodenum In the fourth case a comparatively long period without pain was followed by pains and bleeding According to Zukschwerdt and Horstmann the percentage of permanent cures varies between 90 and 98 percent among authors who are in a position to observe larger series of cases Stress is to be laid on the fact that even these patients who have been mentioned separately because of resection of the pylorus did not show, in all instances, the best permanent results Jacobovici, for instance, achieved 91 3 percent of permanent cures in cases with remaining pylorus and 83 3 percent only where the pylorus had been removed

As the permanent results of simultaneous removal of the pylorus are not better than those obtained by leaving the pylorus in situ, the removal of the pylorus on the contrary meeting with a higher mortality because of uncertain closing of the duodenum, I am not in a position to agree with Borger, Friedemann, Haberer and Nissen, who say that permanent cure is possible only after a simultaneous removal of the pylorus and that the latter should be carried out in all cases

Of special interest are the *permanent results* obtained after *radical operation for a gastrojejunal ulcer* (Table 10) Theoretically speaking the finest results should be obtained by using the Billroth I method, the normal topical condition being restored thereby, whereas permanent exclusion of the duodenum by the B II method and its modifications is said to bring about atrophy of the pancreas with its ensuing drawbacks A control examination of my own material, made for a conference at the Paris Medical School, revealed that *best permanent results were obtained by using the extensive resection method and the II F anastomosis* Of 55 patients, 50 were absolutely free of pain and only five complained of slight pains, which were perhaps due to adhesions resulting from the repeated operations At any rate, there was no sign of a recurring ulcer No patient among them considered himself not cured

Less satisfactory are the *permanent results* obtained by the Billroth I or the Haberer method Of 22 patients, three were *not cured* (13 1 percent failures) A new operation revealed in these cases another duodenal ulcer, and the following subtotal resection with the II F anastomosis achieved a permanent cure

The *poorest results* were to be seen *with the Y shaped anastomosis* of Roux, because only seven of 21 patients became pain free One was improved and *13 remained uncured* Out of these, six were operated upon anew and thus *permanently cured* In seven cases the

TABLE 10

Permanent results of radical operations for gastrojejunal ulcers.

	Modified B II. (Hofmeister-Finsterer)	Billroth I or Haberer modification	Y-shaped anastomosis (Roux)	Total
Cured	50=90.9%	18=81.8%	7=33.3%	75=76.5%
Improved	5= 9.1%	1= 4.5%	1= 4.7%	7= 7.1%
Uncured	....	3=13.6%	13=61.9%	16=16.3%
Total	55	22	21	98

recurring ulcer was indicated clinically by repeated bleeding, pain, a positive x-ray, etc. One patient died after one year because of his diseased stomach. Two patients with severe hemorrhages and heavy pains became completely pain-free at last through medical procedures and were cured at the time of the check-up for the last 10 and eight years respectively.

After a Y-shaped anastomosis, permanent cure is possible only if by way of *a subtotal resection,* when almost no hydrochloric acid-producing mucosa remains, *complete anacidity is obtained.* The latter is to be checked not only by a simple test meal but also by an aspiration at intervals after an alcohol test meal. Let me cite the instructive examples of two brothers.

CASE REPORTS

Case 1: A 44-year-old worker who had been ill for nine years underwent a gastroenterostomy applied at the Hochenegg Clinic, 1914, for duodenal ulcer. No improvement followed. There were heavy pains and eight severe hemorrhages. The patient was admitted on Sept. 24, 1919, to the Mariahilfer Ambulatorium and hospital. I performed the operation with splanchnic anesthesia, and I found a *duodenal ulcer penetrating* into the pancreas as well as a *large gastrojejunal ulcer* on the efferent G.E. loop. I resected the duodenum and *half of the dilated stomach* together with the anastomotic loop. The gastric stump was connected with the blindly closed efferent loop by an end-to-side anastomosis; 10 cm. distally the afferent loop was implanted into the efferent loop, a *Y-shaped anastomosis* according to Roux resulting. The postoperative course was normal, with healing by primary intention.

Six weeks later the patient had new pains, plenty of pyrosis, night- and hunger-pain. Despite repeated medical treatment no relief was obtained. The pains increased to such an extent that even 0.5 gm. of morphine per day offered no relief. A third operation was performed June 2, 1921, with splanchnic anesthesia. A large peptic ulcer of the jejunum, which had penetrated into the pancreas and into the mesentery of the anastomotic loop and which extended exactly up to the junction of the afferent loop of the Y-shaped anastomosis, was to be seen. I did the resection of the anastomotic loop, leaving the bottom of the ulcer in situ; then I performed a *subtotal resection* of the stomach in order to leave not even one-fifth of the normal stomach. *Another Y-shaped anastomosis* was made. A normal postoperative course followed and healing was by primary intention. Morphine medication declined rapidly. Three weeks later the patient was free of morphine without any cure to break off his dependence. He put on 15 Kg. of weight in a short space of time. The *patient was able to eat any food and was in full working capacity.* He was presented several times at scientific meetings and is still able to work despite his 74 years of age *and he has no pains whatsoever.*

Case 2: A 46-year-old joiner had been suffering with gastralgia for 20 years. In June 1903 a posterior G.E. had been performed at Wiener Neustadt. Soon afterward periodic pains and repeated hemorrhages occurred. A second operation with splanchnic anesthesia at the Mariahilfer Ambulatorium and hospital was performed by myself on Sept. 22, 1919. A duodenal ulcer of old standing, a considerably dilated stomach with a posterior G E and a large peptic ulcer of the jejunum which had penetrated into the mesentery were to be found The duodenum as well as half of the stomach together with the anastomotic loop were resected and a *Y shaped anastomosis* was made Healing was by primary intention Soon afterward, heartburn started afresh The pain was not relieved in spite of repeated medical treatment in various hospitals, but was still aggravated The patient had to swallow a great amount of sodium bicarbonate every two hours and required heavy morphine medication Finally even 0 5 gm of morphine a day did not suffice

A renewed operation, after complete failure of treatment by medical procedures, was agreed upon Sept 13, 1921 Midline laparotomy with local (mesenteric) anesthesia and 300 ccm of ether were used A large ulcer of the anastomotic loop was observed, which had been penetrating into the pancreas as well as into the mesocolon and which extended exactly up to the end to side implantation of the afferent loop There was a large gastric stump I performed *subtotal gastrectomy* including the anastomotic loop and carried out a *Y shaped anastomosis* On loosening the jejunum the middle colic artery was hurt in the arcade and had to be ligated For this reason the colon was exteriorized because of uncertain blood circulation and was later removed

The postoperative course was normal and healing was by primary intention This patient too was free from his morphine dependence without particular antidotes On Dec 13, 1921, the exteriorized colon was closed by way of an intraperitoneal *colon resection* with side to side anastomosis Healing followed The patient was *permanently free of complaints,* put on 20 Kg of weight and was able to work hard Seventeen years after this last radical operation the patient died of prostatic carcinoma

For cases in which relapse occurred even after several stomach operations, Mandl initiated the term *"surgically incurable ulcer"* (s i u) He did this more than 25 years ago on the basis of several such cases seen at the Hochenegg Clinic The explanation he gave was that a special disposition for the ulcer is to be admitted, and he believed it to be on the basis of chronic neuritis of the gastric nervous system He called it "status neuroticus ventriculi" In several of my publications I have discussed the term "s i u " and stated in particular that none of Mandl's incurable patients had undergone a radical operation because neither the pylorus nor the antrum had been resected In one of those "s i u" patients I was able to achieve a complete cure (after an observation of 15 years) by carrying out a typical two thirds gastrectomy This was the patient's fourth operation for relapsing duodenal ulcer

The observations, cited by Mandl, which Sauerbruch and Riess are said to have made are no proof of a "s i u " as in the case of Sauerbruch no gastrectomy at all had been performed, rather, the jejunal loop only had been resected because of a peptic jejunal ulcer which had originated after a G E , and the stomach had then been closed This means that the status prior to the first operation had been brought about Because of perforation of a newly acquired ulcer a G E was added to the closing of the perforation After this the patient suffered with the same pains, resulting from a peptic jejunal ulcer, which was to be expected In those patients mentioned by Riess a rather small resection had been performed The last operation resulted in a permanent cure

The term "s i u" in the German language does not mean that despite repeated operations the ulcer bearer could not have been cured, but it does mean a *quality* on the ground of which it is *impossible* in a specified case to *heal* an ulcer bearer by way of *the most radical operation* It is correct to say that in some cases the ulcer bearers were not cured by three or four or even more operations the latter having been insufficient These are some cases of *"surgically not cured"* ulcers, but not of "s i u," because by avoiding certain faults one succeeds at last in curing such patients permanently There is another aspect of the term of "s i u" with which I do not agree A conscientious doctor who is convinced of surgical incurability would not advise the patient to undergo another senseless operation, which would just mean unnecessary polypragmatic action It is correct to state that the healing of an ulcer does not come about with the same ease in all cases, furthermore that some ulcers are cured quickly by medical procedures whereas others recur even after an apparently radical operation I should therefore think it more useful to eliminate the term "s i u" and to divide the ulcers into three groups

1. Ulcers *curable by medical procedures,* no operation being necessary.

2. Ulcers *curable easily by surgical methods,* which have relapsed over and over again after medical procedures and which need an operation. A simple G. E. in some of those cases brings about permanent cure. A gastrectomy, however, even with a Y-shaped anastomosis, will do the job.

3. Ulcers *hardly curable by surgical methods.* This group comprises ulcers relapsing several times despite numerous operations because permanent anacidity or at least subacidity was not established. The neutralization of the gastric juice, which has remained acid owing to the small resection, cannot be accomplished on passing into the jejunum because of a Y-shaped anastomosis or because of an entero-anastomosis added to the end-to-side anastomosis.

In 1940 I referred to 23 cases of *recurring gastrojejunal ulcers* preceded by at least two to six operations.

Of the 23 patients, the reason for *the relapse* in 12 cases was *the Y-shaped anastomosis* which I had used myself six times in my first years as the radical operation for peptic jejunal ulcer. I warned against the use of this operation at the Surgical Congress at Berlin, 1924, owing to personal bad results, for in 21 radical operations for peptic jejunal ulcer with a Y-shaped anastomosis, I had 13 relapses. Despite this, the operation is being applied at the present time. Only if permanent anacidity is achieved through a *subtotal* gastrectomy do the patients become permanently cured. The brothers previously mentioned are evidence of that.

In five cases the *entero-anastomosis* had favored the recurring ulcer. The entero-anastomosis added to an ordinary end-to-side anastomosis is not so harmful as the Y-shaped one, because the entero-anastomosis (according to my own experiences) is used by the intestinal contents (bile and duodenal secretion) when a hindrance is distally located. Under normal conditions most of the contents are shifted through the normal channel despite *the existing wide side opening.* X-rays show that most of the contrast medium is evacuated through the duodenum in cases in which G. E. has been performed and the pylorus does not show stenosis.

We do know that the treatment of chronic constipation by a simple entero-anastomosis does not relieve the patient of his complaints. Despite ileotransversostomy or ileosigmoidostomy, the x-ray shows the flowing of the major part of the contrast medium into *the efferent loop and therewith into the cecum,* notwithstanding the wide anastomosis where scybala of considerable size may originate, liquid contents pass the anastomosis, sometimes giving rise to sporadic diarrhea. That is why I never performed an entero-anastomosis in a case of chronic constipation. Rather, should an operation be considered at all, I resort to hemicolectomy either on the right or on the left side.

When an entero-anastomosis is added to a stomach resection with a typical end-to-side anastomosis (as Reichel suggested in 1921 for complaints caused by the retrograde filling of the afferent loop) a peptic jejunal ulcer may be expected. The contents of the duodenum flow through the entero-anastomosis and the acid stomach contents (because of the sole antrum resection) cannot be neutralized on entering the jejunum because the duodenal secretions are absent. In this respect the case of repeatedly recurrent peptic jejunal ulcer in which I had to add an entero-anastomosis for technical reasons on the last but one operation is of special instructive value.

CASE REPORT

A 39-year-old farmer had been suffering from his stomach for the last 20 years. *Appendectomy* was performed in 1929 for an acute fit of appendicitis. In 1930 he underwent gastro-enterostomy because of a duodenal ulcer. A third operation was carried out in 1932, owing to a peptic jejunal ulcer. The duodenum and the pylorus, as well as the anastomotic loop, were *resected.* The duodenum was closed blindly. *Both of the jejunal loops* were *implanted* into the stomach lumen *separately* so that the entire duodenal content was bound to empty into the stomach. Soon after the operation the pains reappeared, and the acid quota was 40/60. Medical measures brought about no improvement.

The fourth operation was performed in May, 1933. A *large peptic jejunal ulcer* at the afferent loop was to be found. *Both jejunal loops were resected,* together *with part of the stomach.* Circular [illegible] of the jejunum [illegible] made according to [illegible] was [illegible] Two months later acute pa[illegible] [illegible] and the pa[illegible] [illegible] every two hours. [illegible] The x-ray showed a third [illegible]

The third operation [illegible] large tumor in the [illegible] [illegible] in the vertebral column [illegible] then the patient came [illegible] The radical operation [illegible] his pains, owing to [illegible] which were healed [illegible] On Feb. [illegible] took place a [illegible] of the old scar [illegible] A large plastic [illegible] surface of the liver [illegible] also a [illegible] loop which penetrated [illegible] The jejunum [illegible] together with the [illegible] End-to-end anastomosis [illegible] was made.

Owing to [illegible] the afferent loop [illegible] was therefore [illegible] In the first [illegible] vomiting and [illegible]

[illegible]

after resection. At the control examination in 1939 all of these *patients were free of pain*. According to my other experience, they may be expected to remain pain-free permanently. Unfortunately no further news was to be had.

It is correct to state that *mortality was relatively high* in those repeated relapse cases. In 24 operations (one patient was operated upon twice by myself) four deaths occurred (16.6 percent).

One of these was due to the operative technic. A *necrosis of the posterior wall* was the consequence of a too radical detachment of the stomach. One death was due to *peritonitis* and happened because of insufficient asepsis in a foreign hospital (in the lobby of the operation theater purulent wounds were dressed). A 47-year-old physician, on whom the radical operation had been performed with mesenteric anesthesia and *ether narcosis* (390 cc. ether), died 36 hours later because of a *heart paralysis*, after stool and gas had already been evacuated. However, the patient had become a morphinomaniac of considerable degree. The fourth case involved an exceptionally difficult operation, as there were two stomach-jejunum-colon fistulas. The 51-year-old patient, who was emaciated almost down to his skeleton, presented me with a difficult anastomosis of the jejunum. In this case an intestinal fistula originated on the eighth day, requiring jejunostomy. Six days later death occurred because of pneumonia.

This high mortality quota is being made up for by the fact that even *apparently surgically incurable patients were permanently cured*. The 1939 check-up revealed *18 out of 19 patients*, who had well recovered from the operation, to be *completely free of pains*. One had no gastric complaints but had pains caused by a ventral hernia. Four were operated upon 6-10 years ago; six 11-18 years ago. Of the latter, one died of pulmonary tuberculosis 11 years after the operation and one 17 years after the operation from a prostatic carcinoma. Of the cured patients one is remarkable for the fact that five different surgeons had performed his five gastric operations.

CASE REPORT

A 33-year-old clerk had his first operation in 1910, when a *posterior gastro-enterostomy* was performed. His second operation took place in March, 1917, because of a peptic jejunal ulcer. The ulcer was excised, the G.E. closed, an *anterior G.E.* with entero-anastomosis was then performed. The third operation took place in October, 1917, because of another peptic jejunal ulcer which had penetrated the anterior abdominal wall. The *antrum* together with the anastomotic loop was *resected*, but the entero-anastomosis was left. An end-to-side anastomosis between the gastric stump and the jejunum proximal to the entero-anastomosis was performed. The fourth operation followed on March, 1924, because of vomiting due to a stenosis caused by a large tumorous ulcer. The blindly closed efferent end of the entero-anastomosis was implanted into the posterior wall of the stomach end-to-side, a *Y-shaped anastomosis* having resulted from this. Vomiting ceased, but pyrosis continued.

The fifth operation I performed in November, 1924, because of a two-month-old *gastrocolic fistula* with considerable emaciation. The fistula had developed on the spot of the last anastomosis. *Resection* of the *transverse colon* with side-to-side anastomosis, *resection of the anastomotic loop* together with the entero-anastomosis was made, and an end-to-end anastomosis of the jejunum and a *subtotal gastrectomy* (10 cm. of the lesser and 15 cm. of the greater curvature) with a H.F. anastomosis concluded the operation. The specimen showed a two-finger-breadth fistula of the stomach, jejunum and colon on the last-applied end-to-side anastomosis, the old peptic jejunal ulcer having healed up in the meantime. Healing followed, with increase of 20 Kg. of weight. The patient could eat any food and was completely devoid of pain. Four years later his pulmonary disease of old standing became exacerbated (the patient was a heavy smoker). Finally a laryngeal tuberculosis was the reason for the patient's admittance to the Chvostek Clinic, where he died Dec. 28, 1928. The postmortem revealed no new pathological phenomena of the stomach.

CONCLUSION

Even in *cases of repeated relapse a permanent cure may be achieved if the reason for the repeated recurrences is too small a resection, the Y-shaped anastomosis, or if the entero-anastomosis* was eliminated by another operation. These cases have become another proof for the necessity of extensive stomach resection in the treatment of ulcer. Of late, *vagus resection* has been suggested by Dragstedt, a method which is largely used abroad.

Mandl referred two months ago to the results achieved by this method so far in the United States, in an interesting and very important address delivered at the Vienna Medical Society He reported his own experiences with 50 operations Out of 48 patients treated by vagus resection, 47 were pain free, having lost their pains one or two days after the operation They were able to eat the regular hospital diet, which seems very important in view of our present economic situation

On the basis of his experiences up to the present date Mandl believes that the vagal resection is able, cautious criticism admitted, to replace the operation of Madlener in cases of highly located gastric ulcer and the resection for exclusion in cases of a downward-located duodenal ulcer penetrating into the pancreas The resection of those ulcers, with all its major dangers, could thus be avoided, according to Mandl

Should observation over a period of many years prove the permanent successes to be as good as those achieved by extensive resection, this would mean another step forward in the treatment of ulcer, which would be even more important than the fact that 30 years ago extensive resection was recommended instead of simple gastro enterostomy

SUMMARY

The *extensive two thirds resection* suggested by the author 30 years ago in the treatment of gastric and duodenal ulcer has been applied in the author's ward, as well as in various private hospitals, in 8,230 cases The *mortality* for resection of uncomplicated gastric or duodenal ulcer was 2 6 percent (2,191 resections with 58 deaths) in the private hospitals On the ward of the Allgemeines Krankenhaus, between 1935 and 1947, it was 3 9 percent (4,522 resections with 180 deaths) In *resection for exclusion* in 119 cases where the pylorus had been left untouched, five deaths resulted, whereas 13 7 percent mortality was observed when the pylorus had also been removed Out of 614 patients with *ulcer near the cardia,* 48 died, the *arch shaped resection* had a 10 3 percent mortality where the ulcer had penetrated into the pancreas (426 resections with 44 deaths) Out of 109 patients whose ulcers had not penetrated, all were cured after an arch shaped resection and a Billroth I anastomosis Of 79 operated on by the method of Madlener, four died

In cases of *acute profuse hemorrhage* the resection as an *early operation* met with 3 6 percent mortality (165 resections with six deaths) The *late operation* was followed by 31 deaths in 136 resections (22 8 percent) mainly because of parenchymatous degeneration of the organs due to anemia As for the *acute perforation* of an ulcer, in 90 resections four patients died (4 4 percent), there was a 25 percent mortality in 208 ruptures covered by stitches *Radical operation for peptic jejunal ulcer* showed 11 9 percent mortality in 293 uncomplicated cases, whereas in 49 cases complicated by a hemorrhage or a colon fistula the mortality was 40 8 percent

The *permanent results* were very good after extensive resection A control check up in 1933 revealed 234 of 244 *gastric ulcer patients* to be completely free of pain (95 8 percent) Ten suffered with minor pains (4 4 percent) and none was uncured For *duodenal ulcer,* of 508 resected patients, 481 (94 6 percent) were absolutely cured after six to 21 years Ten were improved and 17 (3 3 percent) were uncured The *frequency of peptic jejunal ulcer,* indicated by Starlinger to be 0 6 percent, was 0 03 percent only (5,942 resections according to the Hofmeister Finsterer method, with two peptic ulcers of the jejunum reoperated on by the author himself)

In *resection for exclusion* without pylorectomy, 78 of 90 patients were completely cured, two were improved and uncured, among whom there were five gastro jejunal ulcers (all operated on prior to 1926) In resection for exclusion with pylorectomy, of 35 patients 27 remained cured, four were improved and four were uncured

In the *radical operation for gastrojejunal ulcers* the best permanent results were obtained by the extensive resection and Hofmeister Finsterer anastomosis Of 55 patients, 50 were completely cured, five improved and none uncured With less extensive resection and Billroth I or Haberer anastomosis, of 22 patients there were 18 cured, one improved and three uncured The *poorest results* were observed from *resection with a Y-shaped anastomosis.* Of 21 patients only seven were cured, one was improved and 13 remained uncured. Only a *subtotal resection* with *permanent anacidity* established will yield permanent cures and may do so even with a Y-shaped anastomosis. Two brothers are cited, who remained absolutely pain-free after a subtotal resection for recurrent gastrojejunal ulcer, despite a renewed Y-shaped anastomosis, for 17 and 27 years respectively.

The ulcer which seems to be *surgically incurable* and which recurs despite several operations *may be avoided* by a renewed operation which eliminates the reasons for the repeated recurrences. They are: (1) a *Y-shaped anastomosis;* (2) an *entero-anastomosis* added to the normal end-to-side anastomosis; and (3) *too small a stomach resection.* Thus the patients may be permanently cured. Of the 19 who were dismissed as cured, 18 had remained absolutely pain-free for four to 18 years.

It is to be decided by further observation whether or not the vagus resection suggested by Dragstedt yields the same good permanent results that are achieved by extensive stomach resection.

RIASSUNTO

La resezione di 2/3 dello stomaco, proposta dall'A 30 anni or sono per la cura delle ulceri gastriche e duodenali, e' stata eseguita in 8230 casi. La mortalità operatoria nei casi operati nelle cliniche private è stata del 2,6% (58 esiti letali sopra 2191 resezioni).

Nella sezione chirurgica dell'Allgemeines Krankenhaus è stata un pò più elevata: 180 casi letali sopra 4522 resezioni eseguite fra il 1935-1947. In 119 casi nei quali il piloro non è stato rimosso la mortalità è stata del 6%: è salita al 13,7% quando anche il piloro è stato asportato. Sopra un totale di 614 pazienti operati di ulceri prossime al cardias, 48 sono morti. La mortalità operatoria è stata del 10,3% nei casi in cui l'ulcera era penetrata nel pancreas (44 casi di morte sopra 426 resezioni). E' stata invece nulla nei casi non penetranti (109 casi operati con una resezione ad arco ed anastomosi alla Billroth I). Sopra 79 operazioni eseguite con la tecnica di Madlener, sono occorsi 4 casi letali.

La mortalità è stata del 3,6% nei casi operati precocemente per emorragia acuta (6 casi sopra 165 resezioni). La mortalita è risultata maggiore nei casi operati tardivamente, per lo più in seguito ad una degenerazione perenchimatosa degli organi da anemia (31 casi sopra 136 resezioni). Sopra 90 casi operati per perforazione acuta, 4 sono morti.

I risultati a distanza, dopo ampie resezioni, sono apparsi ottimi. Sopra un totale di 244 casi operati nel 1933, 234 non hanno più lamentato alcun disturbo. I rimanenti 10 casi hanno accusato solo lievi dolori.

In quanto alle ulceri duodenali, sopra 508 casi sottoposti alla resezione, 481 sono apparsi completamente guariti dopo un intervallo da 6 a 21 anni. In 10 casi è occorso solo un miglioramento: in 7 casi le condizioni sono rimaste immutate.

Le ulceri che sembrano inguaribili con la cura chirurgica e che recidivano nonostante ripetute operazioni possono essere prevenute mediante una nuova operazione che elimini la causa delle successive recidive. Queste sono dovute:

1) ad anastomosi eseguite a forma di Y.

2) ad enteroanastomosi aggiunte a quella normale, termino-terminale.

3) a resezioni gastriche troppo limitate.

In 18 casi sopra 19, di questo gruppo, la guarigione è rimasta completa dopo un intervallo di 4-18 anni.

Solo l'avvenire potrà decidere se la vagotomia, secondo Dragstedt, offre gli stessi risultati a distanza della resezione ampia dello stomaco.

SUMARIO

El metodo de reseccion que el autor sugirio hacen treinta anos en el tratamiento de las ulceras gastricas o duodenales, se has practicado en el servicio clinico del autor y en varios hospitales privados formando un total de 8230 casos. La mortalidad de todas las resecciones en los casos no-complicados fue de 2.6% (2191 resecciones con 58 muertes) en los varios hospitales privados. En su sala de servicio del hospital publico "Allgemeines Krankenhaus", la mortalidad fue de 3,9% durante los anos 1935 a 1947 (4,522 resecciones con 180 muertes). En 119 casos de reseccion usando

el metodo de exclusion del piloro cinco casos terminaron fatalmente, en cambio, la mortalidad subio a 13 7% cuando el piloro fue tambien resectado

De 614 casos de ulceras serca del cardias, 48 murieron, La reseccion de tipo arco presento una mortalidad de 10 3% en los casos en que la ulcera habia ya penetrado en el pancreas (426 resecciones con 44 muertes) En cambio este tipo de reseccion con anastomosis subsecuente por el metodo de Billroth I, no presento mortalidad en 109 casos no complicatods por penetracion de la ulcera

En casos de hemorragia profusa aguda la reseccion inmediata acuso una mortalidad de 3 6% (165 resecciones con 6 muertes) En cambio cuando la operacion fue ya tardia la mortalidad aumento considerablemente (31 muertes en 136 resecciones) y se debio principalmente a la degeneracion parenquimatosa de los organos por la anemia complicante En las perforaciones agudas de la ulcera la reseccion inmediata en 90 casos tuvo una mortalidad de 4 solamente

Los resultados permanentes en las resecciones extensas son muy satisfactorios Un inventorio hecho en 1933 revelo que de 244 casos de ulcera gastrica 234 estaban completamente libre de dolor, de los diez casos restantes el dolor presente fue leve y ninguno de los casos presento una ulcera activa En 508 casos de ulcera duodenal 487 estuvieron completamente curados, 10 de los casos restantes mostraron mejoria y solo 7 estuvieron incurados

La ulcera que aparenta ser incurable por la cirujia y recurre despues de varias operaciones, se puede evitar con la re operacion que debe de eliminar la causa de su recurrencia Estas causas son

1 Por la anastomosis en forma de X 2 por la entero anastomosis, que ha sido anadida a la anastomosis normal, y 3 por razon de una reseccion pequena e insuficiente del estomago Solo asi el paciente sera completamente curado De 19 casos de ulcera recurrente re operados 18 han permanecido libres de todo dolor por un periodo de 4 a 18 anos.

Las observaciones del futuro decidiran si la vagotomia recomendada por Dragstedt dara los resultados permanentes y tan satisfactorios que la reseccion extensa del estomago da en el tratamiento de las ulceras gastricas y duodenales

SOMMAIRE

La résection de 2/3 de l'estomac suggèré par l'auteur, il y a trente ans pour le traitement des ulcères gastriques et duodénaux, a eté appliquée dans les services de l'auteur et aussi dans différents hôpitaux privés Dans 8230 cas, la mortalité de la résection des cas non compliqués furent 2 6% (2191 résections avec 58 décès) dans les hopitaux privés Dans la salle de Allgemeines Kankenkaus, entre 1935 et 1947, 3 9% (4522 résections et 180 décès) Avec résection pour exclusion, dans 119 cas dans lesquels le pylore n'avait pas éte touché, il y eut 5 décès Dans 614 cas d'ulcères, 48 déces, la résection dans 5 cas a donné 10 3% de mortalité quand l'ulcere avait pénétré dans le pancréas (426 résections avec 44 deces) De 109 cas avec ulcère qui n'avait pas pénétré dans le pancréas, tous les cas furent guéris Dans les cas d'hemorragie profuse la résection, précoce, donna une mortalité de 3 6% (165 résections avec 6 décès) Les opérations tardives furent suivies de 31 décès sur 136 résections, principalement parce qu'il y avait une dégénérescence des organes dûe à l'anémie Dans les cas de perforation aigue des ulcères, il y eut sur 90 résections et 4 décès

Les resultats permanents furent tres satisfaisants apres une résection ètendue, 234 cas sur 244, d'ulcère gastrique furent completement soulagés de toute douleur Avec les ulcères duodénaux, il y eut 508 résections, 481 furent guéris entièrement après six à 21 ans, il y eut une amélioration dans 10 cas, 7 cas ne furent pas guéris

L'ulcère qui paraît chirurgicalement incurable et qui récidive malgré plusieures opérations peut être guéri par une nouvelle opération qui élimine les causes des récidives répétées

Ces récidives sont

1 Une anastomose en "Y"

2 Une entéroanastomie ajoutée à une anastomose normale bout à-bout

3 Résection gastrique trop restreinte Les malades peuvent être guéris d'une façon permanente.

Sur 19 cas qui furent enumérés comme guéris, 18 cas ne présentèrent aucune douleur pendant une période de 4 à 18 ans.

Les observations futures decideront si la resection du vague suggéré par Dragstedt, donnera les mêmes bons resultats permanents que ceux obtenus par la résection étendue de l'estomac.

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INTERNATIONAL COLLEGE OF SURGEONS
HIPPOCRATES ESSAY COMPETITION

In connection with the celebration of Hippocrates Day on October 23, the International College of Surgeons announces the award of a $100 Government Bond for the best essay on "The Meaning of Hippocrates in the Medical World of Today." Although the award is offered specifically to men of the medical profession anywhere in the world, there is no restriction as to eligibility; manuscripts submitted by non-professional writers will also be considered. Dr. Skevos Zervos, noted Greek physician and authority on the life and work of Hippocrates, will head the judges' committee. All essays submitted should be addressed to

HIPPOCRATES ESSAY CONTEST
1516 Lake Shore Drive, Chicago 10

and must be postmarked not later than March 1, 1950.

Variations in the Blood Supply of the Supramesocolonic Organs*

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FOR the past 10 years I have investigated the variations in the arteries supplying the supracolonic organs in cadaver dissections An extensive report, with 51 figures on the vascularization of the spleen, was published in the *Am J Anat*, in 1942 In this study of 100 spleens it was shown that the pattern of terminal vascularization is never the same Lienal branches entering the spleen varied from 7 to 35 cm , length of the splenic artery varied from 8 to 32 cm , the splenic artery was more frequently tortuous than straight, the splenic arterial bed length varied from 30 to 90 cm , the splenic arterial index varied from 8 to 50 Splenic arteries with an index over 25 were regarded as magistral (30 percent), i e , lienal branches were given off late near the hilus and were relatively few Arteries with an index under 25 were regarded as distributed (70 percent), i e , branching occurred early, lienal branches were many and comprised both superior and inferior polar arteries to the spleen

In regard to the other organs, a statistical study was made in 200 bodies A celiac trunk with three branches (hepatic, left gastric, splenic) occurred in 89 percent In the remaining 11 percent the celiac axis was either split or replaced entirely or in part The common hepatic trunk may be replaced from the aorta (three cases), superior mesenteric (five cases) or left gastric (one case)

An aberrant hepatic artery (not arising from the celiac hepatic) occurs in nearly every other body (42 percent) Aberrant right hepatics occur principally from the superior mesenteric (17 percent), others from the aorta, celiac, retroduodenal, gastroduodenal, superficial cystic, dorsal pancreatic Aberrant left hepatics arise nearly exclusively from the left gastric Of the aberrant right hepatics (26 percent), 18 percent were replaced right hepatics, i e , the only right hepatics present, 12 percent coming from the superior mesenteric, 8 percent were accessory right hepatics Of the aberrant left hepatics (27 percent), 15 percent were replaced left hepatics, 12 percent were accessory left hepatics

Surgical Estimate Nearly every other aberrant left hepatic from the left gastric (23 percent) constitutes the only left hepatic present and three out of every four aberrant right hepatics from the superior mesenteric (17 percent) are replaced right hepatics

In 86 percent, the right hepatic artery is behind the hepatic duct or common bile duct In 14 percent it is in front

The origin of the cystic artery from the right hepatic occurs chiefly in the cystic triangle of Chalot, whose boundaries are inferolaterally, cystic duct, medially, hepatic duct, cephalad, cystic artery or right hepatic A single cystic artery occurred in 76 percent, and a double cystic artery was present in 24 percent Double cystic artery is explained on the basis that the superficial branch of the cystic which is distributed to the free, peritoneal surface of the gallbladder, and its deep branch, which is distributed to the attached surface of the gallbladder, have separate origin Frequently the deep cystic arises from the right hepatic to the right of the hepatic duct in Chalot's triangle, the superficial cystic then arises to the left of the hepatic duct from the right hepatic, left hepatic or middle hepatic, or it may arise from the gastroduodenal, retroduodenal or superior mesenteric, in which case it ascends in front or behind the common bile duct and lies caudal to the cystic duct

Accessory hepatic ducts occurred in 16 percent and joined either the right or left branch of the common hepatic duct, the hepatic duct, the cystic or common bile duct The junction point of the cystic with the hepatic duct may occur to the right, to the left, anteriorly or posteriorly to the hepatic duct; it may be high, low or intermediate in position. Frequently the cystic duct is extremely long, being firmly united with the hepatic duct for several centimeters (2-4) before opening just above the duodenum into the hepatic duct to form the common bile duct.

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Fissured Area Under the Gallbladder: In many instances an artery having relationships to the cystic duct comparable to those of the cystic artery is not the cystic but a liver artery, i.e., a branch of the right hepatic selectively distributed to a fissured area under the gallbladder. This right inferior lobular branch may give off the cystic artery. The fissured area is at times supplied by an accessory right hepatic from the superior mesenteric.

Just how much damage is done when a liver artery is severed, and just how many so-called liver deaths are due to interference with an adequate blood supply by the severing of a major liver artery remains to be determined. An aberrant right hepatic ascending from the superior mesenteric behind the common bile duct, or a right hepatic looping down in caterpillar-like fashion toward the cystic duct in Chalot's triangle may readily be severed, thus depriving the right lobe of its blood supply.

Is there an intrahepatic anastomosis between the numerous (25-50) hepatic branches entering the liver? If so, what is its extent? This work shows that extrahepatically there are many instances of anastomoses between branches of the right, left and middle hepatics, especially in the umbilical fissure and between branches supplying the caudate lobe. Aberrant right hepatics show anastomoses with branches from the celiacal hepatic; aberrant left hepatics from the left gastric anastomose with branches from the middle and left celiac hepatic.

Contrary to textbook teachings, detailed dissection has shown that the hepatic artery does not enter the liver as a single entity of right and left hepatics, but that extrahepatically it becomes subdivided into numerous branches (25-50), each selectively distributed to a liver area, as is readily ascertained when the branches in the porta hepatis, in the umbilical fissure, in the fissure under the gallbladder are examined. The quadrate lobe is supplied by the middle hepatic, a branch of either the left or right hepatic. The caudate lobe is supplied principally by a branch of the right hepatic which passes under the portal vein.

This investigation reveals the constant presence of the four following arteries not found in textbooks of surgery but occasionally mentioned in anatomic texts. Because of their importance in collateral circulation they should henceforth be described and illustrated in texts.

1. The supraduodenal artery of Wilkie is a small branch of the hepatic extending to the first part of the duodenum. It may be the artery involved in hidden bleeding of peptic ulcers.

2. The retroduodenal is the first large branch of the gastroduodenal. Surgically considered, it is very important, for it passes in front of and then behind the common bile duct to the back of the head of the pancreas and duodenum, where it forms an extensive arcade which unites with the superior mesenteric via its own inferior pancreaticoduodenal, or via a common inferior pancreaticoduodenal, the latter then picking up both the anterior and posterior duodenal arcades.

3. The dorsal pancreatic is a large artery (4 mm.) which may readily be found where the splenic vein joins the superior mesenteric to form the portal vein. The artery originates either from the celiac, the first part of the splenic or hepatic, or independently from the superior mesenteric or the aorta. In instances when it comes from the celiac it is very large and functions as the middle colic or as an accessory middle colic. The dorsal pancreatic (a. dorsalis pancreatica) is distributed to the dorsal surface of the pancreas in the neck region; a branch of it supplies the uncinate process, and another branch joins the superior pancreaticoduodenal. The artery may pick up the retroduodenal arcade, or send a branch to the liver.

4. The transverse pancreatic (a. pancreatica transversa) is usually the main left branch of the dorsal pancreatic. Its course is along the inferior surface of the pancreas from which posterior epiploic branches (a. epiploicae posteriores) are distributed to the transverse mesocolon, affording this structure an added blood supply. It then continues toward

the tail of the pancreas, where it usually anastomoses with the a pancreatica magna of the splenic In some instances the artery is large enough to constitute an a splenica secunda

SUMARIO

Este estudio revela la presencia constante de cuatro arterias que no estan descritas en los textos de anatomia y cirugia Dada su importancia en la circulación colateral estos vasos deberán ser descritos e ilustrados en los libros de texto

1 Arteria supraduodenal de Wilkie, une peguèna rama de la hepática que irriga la primera parte del duodeno Puede ser esta la arteria que participa en las hemorragias ocultas de las úlceras pépticas

2 Retroduodenal, la primera rama grande de la gastroduodenal Considerata quirurgicamente muy importante porque pasa por delante y después por detrás del colédoco hacia la parte posterior de la cabeza del páncreas y del duodeno, donde forma un extenso arco que se une a la mesentérica superior por intermedio de su propria pancreaticoduodenal, o por intermedia de una pancreaticoduodenal común la que conecta los arcos duodenales anterior y posterior

3 Pancreatica dorsal Esta arteria grande (4 mm) puede encontrarse facilmente donde la vena esplénica se une a la mesentérica superior para formar la porta La arteria tiene origen variado de la celiaca, la primera parte de la esplénica o hepática, o independientemente de la mesentérica superior o de la aorta En ciertos casos cuando se origina en el tronco celiaco es muy grande y funciona como una cólica media o como una cólica media accesoria La pancreatica dorsal se distribuye en la superficie dorsal del pancreas en la región del cuello una rama de la misma forma el proceso uncinat, otra se une a la pancreaticoduodenal superior Esta arteria puede unirse al arco retroduodenal o bien enviar una rama al higado

4 Pancreatica transversa Esta arteria es la rama principal izquierda de la pancreatica dorsal Corre a lo largo de la superficie inferior del pancreas, de la cual parten ramas epiploicas posteriores que se distribuyen en el mesocolon transverso, proveyendo a esta estructura de un soporte sanguineo adicional Hacia la cola pancreas la pancreatica transversa se anastomosa con arteria pancreática magna de la esplénica

SOMMAIRE

Cette investigation démontre la presence constante de quatre artères qui ne sont pas décrites dans traités d'anatomie et de chirurgie, mais qui, envisagees au point de vue de leur importance dans la circulation collaterale doivent être decrites et illustrées

1 L'artère supraduodénale de Wilkie est une petit branche de l'artere hépatique qui irrigue la premiere partie du duodénum Elle peut être l'artere qui fournit du sang a la perte de sang cachee des ulcères peptiques

2 L'artère retroduodenale est la premiere grosse branche de l'artere gastroduodénale Elle descend en avant puis en arriere du canal cholédoque sur la face postérieure de la tête du pancréas et du duodénum Ici elle forme une arcade qui s'unit avec l'artère mésentérique supérieure tantôt via l'artère pancreaticoduodénale inferieure propre, tantôt via une artère pancreáticoduodénale inférieure commune

3 L'artère pancreatique dorsale est volumineuse (4 mm) Sur bien des sujets on peu trouvé cette artère ou la veine splénique s'unit a la veine mésenterique supérieure pour former la veine porte L'origine de l'artere est tres variable, elle peut venir du tronc coeliaque, de la premiere partie de l'artère splénique ou hépatique, ou, indépendamment de l'artère mésentérique supérieure ou de l'aorte L'artère se dirige vers la face postérieure du col du pancreas qu'elle irrigue, et envoie un rameau au processus uncinatus

4 L'artère transverse pancréatique Dans la plupart des cas est la plus large branche gauche de l'artère dorsale pancreatique Elle se porte sur la face inferieure de pancréas d'ou elle envoie des branches au mésocolon transverse (a epiploicae posteriores) Au niveau de la queue du pancréas elle s'anastomose avec un rameau de l'artère splénique (a pancreatica magna) Dans quelques cas elle est si volumineuse que l'on pourrait l'appeler une deuxieme artère splénique (a splenica secunda)

The Riddle of Peripheral Arterial Embolism

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THE classic picture of arterial embolus may be summed up as follows: a migratory clot (white clot), breaking away from the left lobe of the heart, stops its course in a peripheral artery; here it immediately causes, owing to the thrombogenic substances it contains, an ascending thrombosis in the form of a red clot, which gradually extends and blocks up the higher collaterals; its contact causes reaction of the endarterus, which for a short though varying lapse of time will have a tendency to fuse the clot and the artery. Lastly, from the all-important discovery of Leriche, we know that the thrombosed obliterated artery acts in the same way as a "pathological plexiform nerve" by becoming the starting point of an inhibiting reflex which will take effect upon the collateral arteries, paralyzing them and thus suppressing all circulation in the affected limb. From these facts the surgical conclusions are manifest:

1. The ideal operation is embolectomy, which results in suppression of the cause of all these accidents. This, however, is possible only during a few hours (Fiolle and Funch-Brentano estimate eight hours) before the endothelium becomes affected; otherwise thrombosis immediately forms again at the site of the clot.
2. Beyond this lapse of time, arteriectomy (Leriche) is advisable. This operation puts an end to the arteriolar spasm and saves the collateral circulation at the cost of the truncular—a much smaller sacrifice, as the latter is, in any case, irremediably doomed.

From a medical point of view the importance of spasm in the genesis of accidents calls for the use of antispasmodics and explains the frequent success of purely medical treatment in cases of arterial embolus, especially since the discovery of the powerful anticoagulants, heparin and dicoumarin.

Nevertheless we have had the opportunity of operating on nine patients showing incontestable clinical signs of classic arterial embolus. The facts noted in the course of these operations with regard to the very nature of the lesions, the arterial dynamics and the revival of peripheral pulsations and oscillations, together with data obtained from three patients after death by arteriographic study of the whole arterial system (Heim de Balsac's method), have set before us a series of indisputable facts which are not explained by the classic data given above:

1. The complete absence of clots in the arterial system of a woman operated upon for embolus of the aortic bifurcation (Case 1), and of a man operated on for femoral embolus (Case 8).
2. The gradual revival of arterial pulsation, actually seen by us in these same cases, bringing about rapid clinical recovery.
3. The persistence, on the other hand, of arterial inertia without pulsation, in spite of the embolectomy and in spite of the reflux of blood in the artery (this was observed in five cases).
4. Roentgenologic proof that the obliteration may lodge not only in the principal artery but in the collaterals, and at the same level.
5. The revival of peripheral oscillations immediately after ablation of the clot by arteriotomy, and their constancy from then on whether circulation was stopped or in progress in the arterial trunk (Case 4). The revival of arterial beating without revival of oscillations after operation, resulting in clinical recovery (Case 1).
6. The clinical results of the operations: (a) good when arterial pulsation reappeared, whatever was the type of operation—arteriectomy, embolectomy or simple arteriotomy (Cases 1, 3, 5 and 8); (b) null when arterial pulsation did not reappear in spite of embolectomy and the reflux of blood.

For months we were baffled by this puzzle, but all these facts became clear as soon as we realized that the hypothesis of embolus had to be abandoned in analysis of these accidents, and the two following postulates adopted instead

1 The initial accident is not a result of a migratory clot, but a sequela of sudden segmentary cessation of arterial beating—the arrival of the clot at this level is secondary, and is the more rapid as the circulatory collapse is greater in intensity

2 Embolectomy on the main trunk may, like arteriectomy, bring about cessation of the arteriolar spasm that blocks collateral circulation, though there may be a certain degree of *independence between the truncular and the* arteriolar circulation

All this is hypothesis, but it must be borne in mind that the *classic notion of embolism is itself no more than a pathogenic hypothesis, aiming to explain a very positive clinical anatomic syndrome* But the value of a hypothesis is limited to the degree to which it permits the elucidation of all facts observed As we shall see further on the embolic theory does not fulfil this requirement Moreover, a hypothesis is of no interest, medically and surgically speaking, unless it carries practical sanctions The dynamic theory, favored by us, is rich in these practical sanctions it permits us to group all accidents termed embolic or pseudo embolic in one common classification "the syndrome of acute ischemia of the limbs a syndrome of varied etiology—arteritis phlebitis, simple spasm or even embolus Whatever may be the cause, the medical and surgical advantages are the same, differing only in the surgical methods used and their adaptation to the lesions noted

Nine cases might be considered a very limited experience upon which to base a hypothesis, but the condition is not a common one in this country and we are not aware of any more abundant French personal statistics Moreover, the great interest of our cases arises from the fact that they have been studied from a new angle and through research areas formerly unexplored, to the extent of our bibliographic investigations, neither total postmortem arteriography nor peripheral oscillometry during operation seems to have been employed elsewhere Neither is the condition of the arterial dynamics, before and after intervention, even mentioned in most of the operative protocols

CASE REPORTS

Case 1 Embolus of the right axillary artery Arteriectomy On March 31, 1936, at 10 30 a m , a woman aged 73 was attacked by severe pain *and impotence of the right arm, with pallor and* chill The pain was most penetrating in the forearm and lasted throughout the night, though the hand became slightly warmer than in the afternoon

The patient was examined on April 2 There was cyanosis of the hand and forearm, gradually fading in the upper part of the forearm toward the small of the arm, where the teguments were normal in hue The hand and arm were slightly warm The fingers moved a little but were feeble and could not be fully extended

The peripheral pulse was silent, Pachon's apparatus revealed no oscillations The extensors could be stretched passively but were without contraction The pulsations of the artery could be felt high up in the armpit and under the clavicle, but they extended no further, and beneath the pectoral *a painful spot was discovered*

Operation was performed at 11 a m on the same day 48 hours after onset, with the patient under local anesthesia

The axillary artery was exposed and the vessel denuded The median nerve was folded outward and the cubital nerve inward Beneath them, the artery appeared enlarged and pulsatile lower, under an ecchymotic spot, it was contracted and without pulsation, hard to the touch and distinctly full This mass extended 4 cm , beyond it the artery was flexible As 48 hours had elapsed since the clinical onset of the disease, *arteriectomy was performed over 4 cm of obliterated artery*

Results The pain ceased immediately The hand, though still impotent, became warmer and less pale

In the afternoon (five hours after the operation) *flexibility was restored and the patient was able* to open her hand She was no longer in pain The next day, the aspect of the forearm and the hand was normal, no pulsations existed, but there were slight oscillations On the fourth day the findings were similar, but except for slight muscular weakness the movements of the hand and fingers were completely restored The patient was discharged from the hospital

She returned on the eighth day to have the stitches taken out The functional result was excellent The oscillations were faint, but the hand and arm were normal in aspect

On the 20th day the patient died suddenly from abrupt hematemesis Autopsy was not permitted

Examination of the Fragment Artery—The median external sheath and tunica intima were intact The endarterium was destroyed The clot appeared adherent and adjusted to the internal tunic, scarcely recognizable in places. This tunic must have become detached with the clot when the latter was extracted, for no trace of it remained along the greater part of the surface, and the sheath was formed by the tunica intima.

Case 2: Mitral stenosis with cardiac insufficiency. Syndrome of embolus of the aortic bifurcations. Exploratory arteriotomy on the right primitive iliac and the right external iliac arteries. Postmortem opacification. Autopsy.

A woman aged 37 had been admitted to the hospital six months previously for mitral endomyocarditis, badly tolerated, of nearly a year's duration. There were complete arrythmia, right pleural effusion and an enlarged liver. The woman had been our patient for five years, since she was 32; at that time her mitral condition was well tolerated, the cardiac rhythm was regular and sinusal and the roentgen outline was not increased, though it presented the typical "mitral" configuration. The cardiopathic condition had been discovered during her first pregnancy at the age of 22. Her second pregnancy occurred at 27. There was a history of chorea at the age of six.

The present attack started suddenly at 7 a. m. with sharp pain in the right thigh. At 10 a. m. the patient was still suffering acute pain in the legs, which she was unable to move. The color of the right leg was that of wine sediment; it was painful on palpation, and the skin was cold. The left leg was similarly affected, but less severely; motility remained; some pain was present; the teguments were cold to palpation, and the oscillations were abolished (as in the right leg) at the top part of the thigh; the abdomen was tight and slightly swollen, and palpation of the hypogastric area caused pain.

Operation was performed at noon, five or six hours later. (Anesthesia, evipan and Schleich—median supra- and subumbilical laparotomy). The uterus and its adnexae were of a violet tinge and in some places livid. No liquid had escaped into the peritoneum. Both right and left external iliac arteries were small and showed no pulsation. The right was smooth to the touch, the left contracted. The aortic bifurcation was pulsatile. The right iliac primitive artery was denuded after section between two ligatures of the utero-ovarian ligament. Both ends were understretched at the top by a rubber probe and lower by a catgut. Upon an oiled stratum of compresses, the blood vessel itself being oiled, arteriotomy was performed with a small oiled tenotome; dark, pitchy blood foamed out of the small wound. Enlargement of the wound released a weak pulsatile jet of thick black blood; the artery, therefore, was not obliterated at that level. A second arteriotomy was performed at an inferior level (a few centimeters before it leaves the abdomen) upon the external iliac artery, with the same result.

In view of this lack of arterial obliteration at the right, we decided to suture the arteriotomies; afterward, when we had removed the compress soaked with serum which tamponed them, we observed that, apparently, the incisions had spontaneously stanched and the artery was beating feebly. This impression soon became a certitude; progressively, in a few minutes, the right external iliac beat clearly and with increasing strength. At the same time the left external iliac beat again without any help. The peritoneum and the abdomen were closed.

The operation finished, we observed that the two femorals beat visibly at the arcade; these pulsations could be followed by palpation as far as the middle of the thigh. The precise demarcation between the healthy skin and the wine-sediment coloration at the top of the thigh had disappeared; the transition between the different shades—the normal coloration of the upper thigh, the violet tinge of the lower, and the livid skin of the leg and foot was imperceptible. Half an hour later the livid hue had completely disappeared. We prescribed injection of 0.3 Gm. of acetylcholine every three hours.

On the next day both legs were warm, and the pain had not returned after the operation. The pulsatility of the arteries was felt as far as the popliteal; downward from this there was no oscillation. The right leg up to the knee was analgesic to puncture.

On the second day the two limbs had a normal temperature; the lack of oscillation persisted in both legs (at the superior limb the sign covered seven divisions). The tendinous reflexes were normal. The teguments of the left leg had a normal appearance. On the outer side of the right leg and on the great and second toes there was a pink coloration with a lymphangitic appearance. There was generalized hyperesthesia elsewhere, but puncture at the level of the right leg caused no pain. On the third day a lenticular spot, gray and painless, appeared on the great toe of the right foot.

On the fourth day the oscillations appeared again in the right leg but were still imperceptible in the left. The oscillometric sign covered only one division.

On the seventh day the teguments were normal on the left; sensibility had become normal; the limb was mobile but remained cold; there were no oscillations.

The right calf was edematous and painful. The temperature of the limb was normal, but extension was difficult The oscillations persisted with the same divisional amplitude The patient was in good general condition but anuretic (less than 250 cc.).

During the following days the condition of the legs was unchanged, while, the patient's general condition grew worse. She died on the tenth day (anuria, pulmonary edema, terminal coma).

POSTMORTEM EXAMINATION

Roentgen Study of the Circulatory System After Opacification

To obtain total opacification of the circulatory system, cannulas were placed through careful dissection into the right jugular vein, the carotid artery and the trachea After pulmonary insufflation and cephalic suspension of the subject, the thorax and the abdomen having been respected, we injected 350 cc of gelobarine through the jugular.

This injection was abruptly stopped by bulky clots in the right hollows and the inferior vena cava The only areas opacified were the right auricle, the right ventricle, the conus and the pulmonary artery, and the inferior vena cava to the right iliac bifurcation, with its suprahepatic, renal, splenic and mesenteric tributaries

Opacification of the left side of the heart was then obtained by injection of 1,150 cc of gelobarine through the carotid (a probe had been pushed as far as the left ventricle). The left auricular and pulmonary veins were totally injected, the aorta and all its branches were totally filled, quite visible as far as the aortic branch At the right, *the primitive iliac artery and its two branches*, the external and internal iliacs, were totally injected, the level of the two arteriotomies appeared as a simple spot The right femoral was also well injected, and so were its branches, which looked very dense and well provided *The injection of the* principal trunks and their collaterals went on until those of the arteries of the legs which were injected seemed normal and as far as the foot, where the arches were normal At the left the iliac trunks were not so clearly visible, being hidden under the mesenteric expanse The femoral artery was injected, but its caliber was smaller on the right side *and the collaterals were badly injected. This difference* on the right side was increased at the level of the leg, where the collaterals were scarce and thin There was no injection beyond this level

Examination of the Viscera: There were right pleural effusions and numerous pulmonary infarcts The liver was large (2 250 Gm), and so was the spleen (325 Gm). The kidneys were small and red There was an increased volume of the heart, especially of the two auricles, pearly areas of mitral stenosis were observed, with the auricular endocardium also pearly, there was thrombosis of the left auricle, with an old, adherent, organized clot; retracted aortic sigmoids, thick tricuspid and partially soldered in funnell There was no aortic obliteration Massive obliteration of the two iliac veins was observed, rising as far as the inferior vena cava

Histologic examination of the arteries, from the aorta to the femorals, showed no arterial obliteration at any point.

Case 3: Gangrene of the right hand due to arterial obliteration Embolectomy of the right axillary Postmortem opacification of the cardiovascular system

d mitral cardiac disease,
sharp pain in the right
but recurrent, resulted
in his admission to the hospital

Examination after 48 hours showed signs of early ischemic gangrene (of the fingers and of the right forearm), which had appeared a few hours after the initial pain The hand was pale and livid, the teguments thinned, the ends of the fingers brownish, the forearm was also pale and showed a few marblings A darker line distinctly separated the ischemic zone from the unaffected one, following the line of disarticulation of the elbow.

Pulsation in the axillary artery was noticeable, but not at the humeral level. There was no oscillation.

Diagnosis The condition was diagnosed as axillary obliteration Since after 48 hours no hope was offered by medical treatment, operation was *decided upon. With local anesthesia, it was* performed by Dr. Iselin and Dr. Blicker at the 53rd hour (March 14, 1937), with discovery of the axillary artery at the armpit It appeared white and without pulsation Palpation revealed no painful spot, but a difference of consistency was noted above the root of the lower scapular, the artery was swollen, tight but flexible, whereas lower it *was depressed and seemed empty.*

Arteriotomy This was performed, with clamping upward and downward, on the scapular artery, followed by oiling of the region and the instruments The artery was cut 15 mm. downward at *the spot where the clot seemed located, the latter* existed, ruptured and was extracted with all its comet* without the least difficulty and without any parietal adherence It was 15 cm long, a homogeneous block, and we did not find the least appearance of a white clot at its head

Red pulsatile blood gushed out as soon as the clot was extracted; the loose clamp was tightened, but the blood continued to flow (no doubt by way of a posterior collateral), and the arteriotomy had to be sutured. The suture was rendered impermeable by a fine seam.

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*Chevein in F

After the operation, in spite of liberation of the artery and in spite of the blood that oozed through the suture until the end, no pulsation was revived in the artery. Patting with the sound and rubbing with a compress soaked in adrenalized novocaine were tried without success.

It was presumed that a second clot, supra-adjacent and undiscovered, must have taken the place of the one extracted. The skin was sutured.

Result: The operation had no effect upon the condition of the patient. The ischemic gangrene continued, and in spite of every possible medical precaution it gained the base of the forearm. On March 18, with evipan anesthesia, the elbow was disarticulated, following the line of evolution of the gangrene. No ligature and no suture was applied.

Sequel: The patient's cardiac and pulmonary condition having grown worse, he died seven days later.

Anatomic Examination (Professor Soulie): Examination of the amputated forearm revealed dry gangrene, with withering of the fingers. The arteries were isolated and dissected. They were permeable. Histologic examination of the different arteries of the forearm revealed no alteration of the permeability of those vessels, though in some places there was a polynuclear infiltration of the mesarterium.

Injection of the arterial system by means of our technic (1,600 cc. of gelobarin; left intraventricular) darkened perfectly the left side of the heart, the pulmonary veins and the whole aortic tree. The arterial system of the left arm, totally injected, was absolutely normal; to the right, on the contrary, we observed a frank stoppage of the injection of every vessel (large trunk or ramifications) at the same level, exactly at the fold of the armpit. We observed even on the axillary artery the scar made by the arteriotomy, but the obliteration was spotted on the distal side at a distance of about 1 cm.

Roentgenograms of the thorax and of the abdomen showed the aorta enlarged, sinuous and rather irregular. The iliac arteries were also sinuous, and in some places their edges were irregular. The arteries of the lower limbs were totally injected to the end of the right foot, whereas on the left the femoral was not injected and the collaterals were less bulky and fewer.

The left ventricle was normally bulky, and so was the left auricle, which developed toward the right, as it usually does in the presence of mitral cardiopathy. The pulmonary veins, well injected, formed a bulky network of normal arrangement.

Removal of the artery was impossible, as permission for autopsy had been refused.

Case 4: Syndrome of embolus of the right leg. Embolectomy of the right external iliac artery.

A man aged 35, with mitral cardiac disease of long standing, had had left hemiplegia six months previously and was in a state of cardiac insufficiency. On April 28, 1937, at 2:15 p.m., there was severe pain throughout the right leg, with immediate paralysis and chilling. Oscillations, when measured, were found to be abolished on the right and feeble on the left. The general condition was severe. At 7 p.m. there was no change in the patient's condition. A marbled, cyanotic zone extended as far as the root of the thigh, particularly on the external aspect. No arterial pulsations were perceptible. Oscillations measured 0 at the right leg, ½ at the right arm, and 1½ at the left leg. Tachyarrythmia was considerable; the patient was dying; his blood pressure was so low that it was impossible to measure.

Operation was performed the same evening at 7:25 (anesthesia: evipan and Schleich). A right lateral laparotomy resulted in very slight bleeding (the teguments were extremely pale). Section of the epigastric artery and displacement of the peritoneum revealed the external iliac artery, which was without pulsation. An enlargement of the central portion of this artery was noticeable, above which the artery was swollen; below there was a depression.

Arteriotomy was performed with the customary precautions. A large black clot was withdrawn, issuing from both ends of the artery. The distal extremity was easily detached by pressure, the central end with some difficulty; an attempt at extraction by means of a small sound was unsuccessful. Palpation revealed pulsation of the primitive iliac artery. Very gentle pressure along the arterial trunk from that point brought forth large clots, and immediately afterward a flow of red pulsatile blood gushed out; this was stemmed by the elastic ligature.

The oscillations were then measured. There were no modifications on the unaffected side, but on the operative side oscillations were revived (amplitude 2½); meanwhile the artery was being sutured under temporary hemostasis.

When the upper elastic ligature was removed, blood oozed from a small space in the suture, without causing any change in the amplitude of the oscillations; neither was this altered when the circulation was stopped by replacing the ligature to allow suture at the point of leakage. On the contrary, when the band was again taken off to verify the efficacy of the suture, the oscillations *decreased to 1½ In spite of the operation, how*ever, the iliac artery did not beat, though it remained flexible and supple

There was normal bleeding of the abdominal wall, which was rapidly closed. Palpation of the femoral artery during the application of bandages revealed slight pulsation, the marbled zone was receding rapidly, and the root of the thigh was becoming normal

Results · The condition of the patient was greatly improved, and his blood pressure had gone up to 10/7 at the end of the operation. The amplitude of oscillation in the right leg (the one operated on) was 3, that of the left leg (unaffected) 1 only. In spite of the administration of strong cardiac tonics and of all our efforts, the patient died at 4 a m.

Autopsy (Dr. de Balsac) Opacification of the cardiovascular system was done by our own technic a sound was inserted in the left ventricle by the carotid and a cannula in the trachea After pulmonary insufflation, 1,650 cc of a barium meal was injected. Roentgen examination of the chest *showed good opacification of the left cardiac cham*bers, and all the aortic system was injected. In the abdomen and pelvis, the right external iliac on the operative side was not injected, neither was the femoral or the anastomosis Injection of the left side was satisfactory. On the thighs, injection was satisfactory on both sides. In the legs injection was very good on the right. On the left (hemiplegic side) no arteries were injected beyond the head of the tibial. In the feet, injection was satisfactory on the right, *no arteries on the left were* injected.

Lungs: The left lung was adherent throughout the lower part. Insufflated to permit detachment from the diaphragm and the lower mediastinum, the whole lower lobe was seen to form a purulent, hepatized sponge. The upper lobe showed diffused congestion.

The right lung was not adherent. It was congested, with small bronchopneumonic foci. There *were no infarcts*

Heart: The pericardium was free, without adherences or effusions; the heart was greatly enlarged. The left ventricle was distinctly enlarged; its walls were thickened and its cavity void. There were no clots The right ventricle was slightly enlarged and also void. The right auricle was distinctly dilated; there were no clots and no alteration of the endocardium.

The left auricle was as large as a Jaffa orange. *All the upper part was considerably* thickened and covered with organized thrombotic material 1 cm. thick. The rest of the auricle was dull and pearly. A patch of thrombosis was adherent to the auricle. The mitral orifice was a rigid incrusted ring, the size of the end of a forefinger. The aortic tricuspid and pulmonary orifices were normal. The pulmonary artery showed slight atheroma; the dimensions were about normal or very little increased. The pulmonary vein showed a thickening of the sheath near the auricle (region of the thrombosis). The aorta revealed medium dimensions and slight atheroma, it was free as far as the iliac bifurcations Thickening of the sheath was noted. *The left iliacs and the external and internal pri*mary branches were free but thickened.

The right iliacs (operative side) showed the following picture: primitive, free but considerably thickened, sheath irregular, commencement of thrombosis. Internal, free but thickened. External, a large adherent clot extending from the head to the level of the operation, with slight subperitoneal barytic infiltration round the operative focus. The right femoral was free but thickened. All veins were free in all regions.

The liver was small and congested. The spleen was black and slightly enlarged. The kidneys were red and rather small.

Microscopic Examination of Vessels: All arteries and veins were normal. However, near the aortic bifurcation, the common iliac artery contained a nonadherent clot. The endarterium was normal.

Case 5: Obliteration at the origin of the left femoral. Embolectomy. Recovery.

At midday on Dec. 29, 1938, a woman aged 62, who was just recovering from subacute pneumopathy, felt vague pain and stiffness in her left leg. *The pain increased, the leg becoming leaden* and chilled. On Dec. 30, at 9 p.m , the left leg was violet-hued from the knee down. The top of the foot and the toes were livid and withered, and the whole region was cold and inert, without any pulsations or oscillations. The muscular mass at the calf was extremely painful. Just below the arch the femoral artery was beating, but 2 cm. from here the inertia was complete. On the opposite side pulsation was normal.

On the same day, at 10 p m , operation was performed with local anesthesia (34 hours after the onset). The femoral artery was laid bare from the arch to the point of the *Scarpa triangle, and* was seen to be distended at the bifurcation by a clot at least 10 cm. long. Elastic bands were placed and arteriotomy carried out. The lower end was voided first by withdrawal of the clots with forceps. A thin clot, several centimeters long, came out first; then, by pressure, the upper clot was brought down. It was large and was followed by a strong gush of blood.

When the ligatures were taken off, the artery was seen to be greatly decreased in caliber by internal thickening of its walls. This fact posed a problem, whether to suture or to perform arteriectomy. As the endarterium seemed intact and the pulsation of the artery had reappeared after evacuation of the clot, the blood coming from both ends, suture was decided upon and carried out with silk in one layer only. As the lower end continued bleeding, it had to be covered. Arterial pulsation was violent to the line of suture, where it stopped. Permeability was proved, however, by the fact that blood escaped from the last stitch. The oscillations had not revived in the leg.

After suture of the wound the foot was no longer livid but violet-hued. Next day it was still violet, but the upper part of the leg had become normal in appearance, without, however, pulsations or oscillations.

On Jan. 5, 1939, the foot appeared normal and the patient no longer complained of any pain, except for slight sensitiveness of the calf on palpation. She was allowed to get up. The clinical recovery of this patient was so complete that she was able to be discharged on foot in June 1940. Oscillations had become normal, but pulsations were still imperceptible at the dorsalis pedis artery.

Case 6: Syndrome of acute ischemia of the right leg. Embolectomy of the femoral artery. Amputation at midthigh.

On July 14, 1944, at Laennec hospital, where he had gone for x-ray results, a man aged 34 felt severe pain in the right calf. The intern on duty examined him and diagnosed embolus, for which he immediately made an injection of novocaine (either intravenous or lumbar, we do not know) and offered hospitalization. The patient refused, preferring to return home.

On the afternoon of the 17th, his foot was marble-hued and the calf showed patches of discoloration, livid and dark red. The pain was intense.

On the morning of the 18th the picture was that of segmental ischemia; there were no oscillations from the thigh down, and the intense pain continued. Palpation revealed pulsation to within four fingerbreadths of the femoral arch. Intervention was decided upon. With the patient under local anesthesia, the artery was bared at the point of Scarpa's triangle. A few faint and irregular pulsations were revealed, by palpation only, at the upper part of the incision. This was at first ascribed to a state of shock, but the blood pressure proved normal; the phenomenon was, then, purely local.

Examination of the femoral vein showed it to be normal. The artery was isolated, and arteriotomy was performed in the middle of the incision, after the placing of a drain round the upper part of the artery. The arteriotomy happened to be exactly at the site of a dark red clot, easily detachable. Very carefully, by means of forceps, it was withdrawn from the upper end, where it extended 4 cm. Red blood followed immediately but was not pulsatile; frothy, it dribbled out in small quantities. Pressure on the lower end brought forth another clot, about 2 cm. long and giving the impression of including the white clot.

At the level of the arteriotomy the internal sheath of the artery was normal, with no sign of arteritis. The artery was closed in two layers, one being insufficient because the blood continued to ooze out, red and frothy. In spite of the embolectomy, the pulsations of the artery did not reappear. The aponeurosis and the skin were sutured.

Result: On the day after the operation the local and general condition of the patient was worse. His leg was amputated at the middle part of the thigh. There was no bleeding. The condition of the patient was transformed immediately after the operation. The volume of urine, notably, was brought to almost 3 litres. Recovery was uneventful.

Examination of the Fragment: The artery was free from clots for about 10 cm., beyond which the popliteal artery and its two branches were blocked by a long, thin clot. The diminution of the artery's caliber was striking, but thrombosis of the popliteal artery extended for over 10 cm. This proved to be a case of arterial paralysis caused by venous thrombosis. Had the operation been carried out on the day of onset, localization and treatment by resection of the obliterated vein would have been simple.

Case 7: Syndrome of acute segmentary ischemia of the right leg. Exploration of the femoral artery. Recovery.

On the afternoon of May 28, 1943, a man aged 52 had a sudden attack of violent pain in the right thigh. (The patient had already lost his left leg in the war.) He was obliged to go to bed at once, and in a few hours' time his foot had become cold and insensible.

Examined at 9 p.m., the leg was cold, insensible and livid. The patient could not move his toes, and had no peripheral pulsations or oscillations existed up to the thigh. In the higher part of the Scarpa triangle, pulsations were revealed by palpation and could be followed up to the point of the triangle but no further. The patient had a fully compensated mitral condition and had been under treatment for a long time.

At 10 p.m., with local anesthesia, the artery was bared at the apex of the Scarpa triangle, where there were faint pulsations. The incision was continued downward as far as the insertion of the third adductor muscle. Very feeble beating was apparent, this increased in amplitude, however, as the artery was bared. This operation was effected gradually, and a few small vessels, sectioned, began to bleed. At the end of the denudation *the artery was beating quite normally*, therefore, as the aim of the operation seemed to have been attained, the wound was closed in two layers.

Pain ceased very rapidly. The foot remained pale but was no longer cold, and the veins swelled normally. Sensibility came back little by little to the normal level.

On the fourth day it seemed that the sequel was nothing more than cutaneous necrotic area *about the size of a two-shilling piece on the* dorsal aspect of the foot and of a half-crown on the heel, but by the next day the livid zone was regaining its normal hue, and by the time the patient left the nursing home the only remaining dark-hued patch was the small eschar on the heel. After the operation the patient was treated by intravenous injections of acecholin-papaverin and cardiac tonics Five cc. of 11 percent novocaine was injected into the denuded artery at the end of the operation. The patient is *still alive*, and, although he suffers from pain in the leg at intervals, there has been no recurrence of acute ischemia

Case 8 Syndrome of embolism of the right iliac artery. Embolectomy. Death.

A man aged 56 had a sudden attack of severe pain The right leg was immediately paralyzed, then the pain decreased sufficiently for the patient to remain 48 hours without complaining, the doctor trying sedatives and local treatment. On the third day, however, the pain became so severe that a surgeon was consulted. The patient was *much afflicted, the whole of his right leg ischemic*, chilled, inert and insensible, his foot, in an early stage of mortification was brownish, and his thigh was violet over the region extending to the crural arch and even beyond the ilium

The patient insisted on an operation, and it was hoped that embolectomy might save both his life and his leg. No pulsation was visible at the crural arch, but as the left leg was normal it was thought possible that the obliteration might be situated *in the right iliac artery*.

Operation: Local anesthesia and oxygen-ether were administered by Dr. W. Maroger. An incision laying bare the subperitoneal surface of the external iliac artery revealed this to be inert, contracted and hard. The radical iliac was flexible but without pulsation, and only a finger inserted as far as the aorta, which was also flexible, permitted the discovery of a few very feeble pulsations. Along the line of incision no artery bled An india-rubber probe was passed under the radical iliac and the skin incised along the femoral artery in the Scarpa triangle. The arterial trunk was laid bare for a length of 20 cm. and was found to be flexible at the lower end of the incision

Arteriotomy, accompanied by the usual precautions, was carried out at the head of the femoral and a blackish clot was extracted without difficulty from the center; this clot was homogeneous and without adherences and was followed by faintly throbbing red blood, which was stopped by drawing on the probe The clot from the lower end was then extracted. It was of the same length. By pressure, *the distal end of the artery was ascertained* to be flexible and void. Suture of the arteriotomy was followed by a flow of blood, proved by several leakages in the line of suture, and these leaks were repaired by more stitches. *There were no pulsations of the artery*, however, and all means in our power were attempted (sympathectomy, applications of serum and novocaine and novocaine and papaverine-acetylcholine by intraarterial injection), but without success, the artery remained inert. Our prognosis was most gloomy.

Fortunately for the patient, the pain was greatly alleviated by the operation, though no other improvement was obtained *We were struck by the daily increase of the rate of blood urea*, which, from 0 Gm. 52 at the beginning, increased by 1 Gm per day and was at 2 Gm. 50 when death took place on the third day after the operation

To our great regret we were refused permission to make a postmortem examination.

The outstanding points of this case are the feebleness of the pulsations even at some distance from the obliteration, the permanent inertia of the artery in spite of the embolectomy and, above all, the increase of urea in the blood

Case 9: Syndrome of sharp arterial obliteration of the left leg. Arteriectomy. Amputation of the leg. Death.

A woman aged 56 had suffered from an old mitral insufficiency for more than six months. On April 3, 1941, she had a fall which, although it did not render her unconscious, resulted in left hemiplegia. She was admitted to the hospital on the same day.

There was flabby paralysis of the arm and the leg plantar cutaneous reflex in retention, with partial incontinence of urine and prostration Sleep was disturbed. The patient was also mentally deficient.

Since June 1940 she had been dyspneic and slightly cyanosed. Th [illegible] alleolar edema and noticeable hepatomegaly. The heart showed complete arrhythmia. The beat was slow, 80 pulsations per minute, with an apical systolic murmur and dividing into two at the second sound. The heart was bulky and distorted by a moderate sally of the medium arch and another sally on the right edge of an average bulky left auricle. The hilums were outlined and a little dark.

The electrocardiogram showed complete arrhythmia and typical auricular fibrillation. There was a slight right preponderance, complex of low voltage not enlarged. The urine was slightly albuminized (0.15 percent) but without any sugar or elements. Bloody urea: 0.55 and 0.60 percent. B.W.: negative; L.C.R. not modified.

A hard abdominal mass of about the volume of a fetal head, an old fibroma, was easily perceived by abdominal palpation. On the 18th day after admission, without the patient's psyche having shown the least trouble, we discovered during a bath an important edematous swelling of the whole left leg (impotent and hemiplegic). The teguments were violet and the limb was cold. There was no pulsation, and no oscillation could be perceived even at the femoral level.

Strong anticoagulants and antispasmodics were administered but caused no improvement. On the following day it was decided to operate. Operation was performed by Dr. Gilbert on April 23, with spinal and local anesthesia.

The left external iliac artery was inert in its lower part but beat at the upper level. Arteriectomy of a 6 cm. segment was performed on both the inert and the mobile portions. Blood gushed rhythmically from the upper segment; the lower segment was empty. It was decided to amputate the leg at the one-third level of the thigh. There was no bleeding from this operation. A second arteriectomy was done on the first 5 cm. of the stump of the thigh, including the whole vasculoneural packet.

Course: The patient was continuously feverish; her condition declined rapidly; the cardiac insufficiency increased, and death occurred on May 6, 1941.

Examination of the Amputated Limb: On April 24, ten hours after the amputation, there was edematous swelling, cyanotic and mortified, of the whole leg, whose teguments now were sphacelated. The foot, on the contrary, was brownish and parchmented.

The skin starting from the knee was normal. At amputation of the section we had observed a femoral artery free and loose, while the nearest vein, of the volume of a thick pencil, was completely filled by a bulky clot, black, homogeneous and adherent.

A cannula was fixed in the artery, and 75 cc. of a creamy suspension of barium sulfate was injected with a hand syringe. One after the other, every artery of the amputated limb was injected. The large popliteal and the anterior and posterior tibial trunks were injected normally. They were regular, permeable and progressively diminishing in size. A few parietal alterations only were observed at the height of the pelvis over 5 or 6 cm.

Each collateral, even the thinnest, was perfectly injected all the way to the toes; so were the perforant plantars. The collaterals involved in section of the thigh, frankly flowing, were limited at the end of the injection; the pressure having been exaggerated, several vascular ruptures occurred to the popliteal, just beneath a visible adherent plate, and in the branches of the calf, in the areas of gangrenous infiltration.

Two roentgenograms confirm these appearances. Dissection of the whole arterial network of the amputated limb confirmed the permeability and the *nearly total integrity* of all the arteries which squeaked under the cut.

Close to the arteries, however, all the deep veins, popliteal and tibial, were turgescent, black, crammed and distorted by a homogeneous, adherent thrombus, more or less significant according to its length and volume. We dissected in the middle of a real thrombotic inflammatory gangrene and through a gangrenous infiltration, which was suspicious.

The superficial veins were normal.

Examination of the Arterial Segments Detached: The external iliac artery, detached by arteriectomy, was normal, flexible and permeable.

The femoral artery, detached in the same way, was also normal and permeable, but close to it was a venous thrombus, analogous to the one in the leg, but not so bulky; the size of the venous string did not surpass that of a pencil.

Histologic Examination: No external iliac artery, femoral, popiteal, or tibial, was more than slightly altered. The endarterial elastic blade and the adventitia were sensibly with no coagulation and no distortion in the arterial port. A single cut revealed a small zone of endarteritis.

All the veins, on the contrary, were filled with bulky clot, adhering to some coats and intensely infiltrated with leukocytes.

General Postmortem Arteriography: Opacification of the whole circulatory apparatus was performed according to our technic on May 8, 1941, 48 hours after death. Through a cannula fixed in the right carotid, 2,100 cc. of a barium suspension was injected without pulmonary insufflation. The left hollows, the pulmonary veins and the whole aortic tree were darkened, but simultaneously the right hollows, the pulmonary artery and the whole caval system were also injected Roentgenograms of the whole body in an upright position showed injection of every cardiac hollow of the pedicle and of the pulmonary vessels (arteries and veins), giving an obscure picture, in the middle of which a large left auricle was seen The abdominal picture was obscure because of the simultaneous opacity of the aorta and its visceral branches, of the inferior vena cava and of its afferents All *these vessels appeared normal*

The picture from the small basin was also obscure, all its central part being occupied by a projection of the vascularized fibroma The aortic and caval bifurcations seemed normal

No arterial or venous opacification emerged from the small left basin The external iliac artery had been tied up The vein was probably thrombosed to that level Only a few collaterals projected at the level of the buttock and at the root of the thigh

To the right the femoral artery appeared normally injected and ramified, but injection of the femoral vein stopped abruptly at the level of Scarpa's triangle

At the level of the thighs no vascularization was seen in the stump at the left, the femoral artery was outlined to the far end of the limb in spite of the fact that no vein was injected

Permission for autopsy was refused, hence we could not determine whether thrombosis of the left femoral vein rose as far as the thigh or even the small basin For the same reason, we could not see why injection of the right femoral vein stopped suddenly Finally, the communication which had permitted filling of all the cardiac hollows and of the two arterial and venous circulations through the carotid could not be determined It was probably an interauricular communication It is notable that the superior vena cava did not seem to be injected

COMMENT

We shall now consider the outstanding characteristics and set out the arguments resulting therefrom in favor of our views, and then demonstrate how the facts published, clinical, surgical, and experimental, are in themselves proof of the judiciousness of those views

ANALYSIS OF OBSERVATIONS

The cessation of arterial pulsation is the primary phenomenon, Cases 1 and 8 can be explained only by simple spasm, since neither operation nor arteriography revealed clots (the opening of the cardiac cavities reveals no sign of the breaking away of a clot) In Case 1 the patient was not decompensated, and six hours and a half after the clinical attack the blood though black, thick and stagnant, was not coagulated Arterial pulsation was renewed while we watched (from what cause? sympathectomy, or perhaps brought about spontaneously by the spacious baring of the trunks and by *the arteriotomy?*), and the alarming clinical and typical accidents regressed immediately

In Cases 2, 4, 7 and 9 embolectomy was easy and efficacious It was followed by a rush of red blood, but it resulted in no revival of the arterial pulsation or in the slightest clinical effect We therefore feel justified in arguing thus

If the arterial paralysis is due to stoppage by a migratory clot, the ablation of the latter should normally result in cessation of the paralysis

If, in some cases, the paralysis persists, the clot is evidently not always of embolic origin

Arteriographic study of Case 3 also shows that the circulatory stoppage was regional, bearing upon the collaterals as well as upon the trunk It is difficult to explain this condition by a theory of embolus—a series of clots having invaded all the arteries of the arm and stopped at the same level

In each of these four cases the artery remained paralyzed and thrombosis recurred In Case 4 the patient was in a condition of complete collapse the arteries were paralyzed and coagulation recommenced *in situ* almost at once, death ensuing a few hours after the operation In Case 2 the patient suffered no collapse and survived for six days after the operation, then succumbed to pulmonary complications, but the clot did not recur opposite the arteriotomy, the notch of which is clearly seen on the x-ray picture The relapse *cannot*, therefore, be attributed to the suture, in spite of the fact that the operation took place 48 hours after the clinical commencement of the accidents

In Case 6 an embolectomy, followed by an immediate resumption of the arterial pulsation, gave a good clinical result, but the fact that the pulsations did not extend beyond the line of suture (although the blood passes be neath the latter and supplementary stitches are necessary in order to obtain absolute impermeability) would tend to establish the existence of secondary obliteration. This obliteration was demonstrated at the last examination by visible stopping of the pulsations at the point of the Scarpa triangle. Thanks to liberation of the collateral circulation, the clinical result was, however, excellent.

That the stopping of arterial pulsation may be due to thrombosis of the adjacent vein is demonstrated by an operation we were invited to watch.

A man aged 54 was subjected to gastric resection. Eight days later he had a sudden pain in the left leg. Two hours afterward there was evidence of ischemia. The surgeon decided to operate at once and did so three hours after the onset. The femoral artery was exposed below the femoral arch, over 15 cm. It was shrunken and immobile. The arterial beating stopped 2 cm. under the arch. The femoral vein alongside the artery was black and filled by a clot, which dilated it. The operation, on our advice, began by freeing the vein from the artery. The beating progressed with the dissection. Finally the thrombotic part of the vein was resected, and the artery was left with normal pulsations.

On the other hand, the arterial palsy may be due to trauma, as was observed in the following case:

A man aged 26 had a compound fracture of the elbow with dislocation, sustained in an automobile accident. He was surgically treated two hours later. On the following day it became evident that circulation was suppressed in the hand and forearm (hand pale and cold, no pulse, no oscillations). Immediate operation was performed on the brachial artery in the lower part of the forearm, with the idea that the artery might be ruptured by osseous fragments or by hematoma.

With the patient under general anesthesia, the artery was exposed between the lower third of the arm (where the lowest beatings were) and its bifurcation. To our surprise, the artery lay on a perfectly normal bed; there was no bony projection, no hematoma and only slight edema. But it was absolutely still, with the beating stopped at the upper part of the incision, and the whole length of the artery was thrombotic. We performed an arteriotomy just above the bifurcation, and by expression we easily extracted a nonadherent long black clot, following which came a pulsating flow of red blood. By expression we emptied the distal part and closed the arteriotomy. The blood passed through, and supplementary stitches were needed to control small leakages, but the beating did not reappear in the formerly thrombotic part. We foresaw a bad prognosis, which proved correct.

Two days later the persistent gangrene obliged us to disarticulate the member at the lower end of the forearm. The brachial artery was dissected and examined; the clot recurred, but it was hardly adherent on a normal endarterium.

We interpret these facts to mean: (1) that normal blood had clotted in a normal artery, which was paralyzed, and (2) that paralysis was entirely due to the traumatism (well known since World War I), which acted on a physiologic basis without anatomic interference.

Finally, the clinical results obtained by our own operations will prove the primary role of the dynamic element. There were four operations—four cases in which the artery resumed beating during operation resulted in success (Cases 1, 3, 6 and 8). There were five cases in which the artery remained inert after embolectomy resulting in failure (Cases 2, 4, 5, 7 and 9).

Embolectomy stops the spasm of the collaterals to the same degree as arteriectomy. In a general way it may be said that, if this axiom were inexact, embolectomy would never result in success, for the collateral circulation would remain blocked, and successful results could be obtained only by arteriectomy. Study of Case 4 demonstrates this action clearly; immediately after ablation of the clot, peripheral oscillations were revived, and their amplitude remained identical from then on, whether the truncular circulation was free or had been interrupted for the requirements of the suture. In this case, operation on the arterial trunk freed the collaterals to the same degree as did the arteriectomy in Case 1, but, as the truncular beating was not revived, the pulsations did not reappear.

Study of our observations reveals that the phenomenon is more complex, for in two cases the action upon the trunk had no influence upon the secondary arteries (in Case 2, neither of the two circulations was liberated by embolectomy) In Case 1 the trunk was liberated but the collaterals did not recover their normal physiology, as, in spite of the palpable revival *of pulsation, the oscillations reappeared only* on the third day, and even then very feebly and on the right side only The arteriographic procedure injected the main artery to perfection but filled the collaterals very defectively We may therefore conclude that subordination of the collateral artery to the main artery, as defined in the theory of arteriectomy, is inconstant It would appear, on the contrary, that the two circulations are relatively independent A greater number of observations would be necessary before one could affirm this hypothesis, the interest of which is purely physiopathologic

ANALYSIS OF THE FACTS PUBLISHED

Clinical Facts Haimovici's treatise appears to us the most complete work thus far published on the subject of arterial embolus, and for the discussion to follow we will emphasize this author's extensive general review A most interesting chapter is devoted to *anomalies of* the clinical evolution of "arterial embolism "

Haimovici describes two forms of benign embolism, "defective embolism" and "occult embolism " "Defective embolism" is a form which, after a more or less dramatic and alarming beginning, evolves toward recovery without having caused gangrene In his book, Haimovici reports 35 cases of indisputable value, gathered from all over the world

"Occult embolism" is a form that gives no sign capable of clearly suggesting a diagnosis of embolus If there is no embolus, why bring forward a similar suggestion? Because the experimental reality of this type of embolus cannot be denied A little further on we shall speak of the classic results of animal experimentation

By means of a certain case of Hallopeau (Dumay's thesis) and its commentary we wish to show how difficult it is to free oneself from a preconceived idea, i e, to get rid of the classic conception of embolus and to study the facts with impartiality

A woman aged 73, a cardiac patient, had sudden pain in the forearm with disappearance of the radial pulsations The next day the pulsations were normal and the patient had no further trouble Two months later she died of heart disease No clot was revealed in the radial artery at autopsy, and the author firmly *insists on "embolus of the migratory type "*

Here is a brief summary of one of Kerr's cases, exactly similar to our Case 2 There were signs of aortic obliteration Operation was carried out by way of the Scarpa triangle The femoral artery having been opened and oiled, a rubber tube was inserted up to the level of the aorta Pumping brought forth black blood, but no clot The surgeon, fearing to carry the operation any further, closed the arteriotomy, and the patient recovered

In spite of these facts, Kerr published his statement under the title "Aortic Embolus '

For these reasons it is useless, in our opinion, to endeavor to follow very closely the etiologic diagnosis of a clinical syndrome of acute ischemia, for, be it spasm or embolus, the treatment is exactly similar, as we shall proceed to demonstrate

Anatomopathologic Facts Before affirming that a clot found in an artery has come there by way of *migration, it is necessary first to* discover the white, so called active, clot at the head of the embolus, and, second, to find in the left lobe of the heart the starting point of this clot

Now, on the one hand, in the cases systematically autopsied by Heim de Balsac, it was impossible to determine the starting point of the migration This negative verification has been discussed at length by Fiolle and Funck Brentano

Fiolle and Haimovici made the same discoveries but decided that in this instance embolus was due to a miscroscopic clot so small that no clinical examination could reveal it "the embolus, though infinitely small, may well be a source of accidents, but these are caused rather by the presence of the embolus than by its action, it might be said that it sets going a mechanical process We will call it 'pretext embolism'—the embolus itself is nothing much but the resulting thrombosis has far reaching consequences "

Leriche, in one of his recent works, an

lyzing Einar Key's statistics, states that 21 percent of patients operated on for embolism revealed no cardiopathy (46 of 225 cases): only 77 were mitral, but intracardiac coagulation was rarely found among them. The mere fact that these emboli did not always relapse and that some of the cures were permanent does not favor a theory of intracardiac coagulation, which it is impossible to reduce to one single clot eliminated by expulsion.

On the other hand, no proof of etiologic embolus can be made without discovery of the white clot—the real clot which has broken away from the heart. In none of the observations published, not in any other of our cases, has it been possible to discover it.

We have still to prove the existence of this minute white clot and to elucidate why it generally chooses to stop in a large artery.

The formation of a brown clot (which Moure calls a "prolonged clot") by thrombosis termed "extensive" does not fit in at all with the embolic explanation.

The white clot would thus be composed of thrombogenous substances which would coagulate the blood contained in the paralyzed segment of the artery, this blood being prevented from circulating by obliteration. Unfortunately the existence of "thrombogenous ferments" in the clots has never been scientifically proved (Fiolle).

Why is the extent of the brown clot so variable, ranging from a few centimeters in some cases to 40 (Gohrbandt) or 68 (Lichtenauer)? According to Fiolle and Haimovici, the variations of secondary thrombosis are controlled by the degree of septicity of the clot. This hypothesis is certainly attractive and undeniably verified by experimentation, but it is contradicted by numerous cases in which culture of the clot has given negative results (Soupault, two cases; Carcassonne and Vernejoul; A. Sicard). As a matter of fact, of 129 cases studied by Danzis in 1933, the infectious element existed in only 23.

Might the Clot be a Consequence of Endarteritis?

Histologic examination of both operative and experimental specimens show that the lesions are situated chiefly on the media, some of them being inflammatory, whereas the clot is aseptic (Soupault). "From the very beginning the media reveals hyanilizing atrophia, muclear pyonosis . . . then appear adventitial troubles also of a circulatory nature, vasodilatation with blood suffusion, alteration of the capillary endothelium, hystocitary invasion, etc."

Fontaine, in an unpublished statement on research, has observed that in cases of aseptic embolus the *intima remained intact for eight or ten days,* followed by endothelial reaction and shortly by the creation of veritable endarteritis to a point preventing distinction between thrombosis and embolus.

On the other hand, Cornil and his collaborators have noted, in cases of septic embolus, immediate endothelial reactions (Leriche).

The parietal lesions in contact with the clot are so extremely varied as to the date of their appearance (in one of Ipsen's cases this occurred *11 days* after the clinical onset, and in another noted by Nicolaysen 28 days, it was possible to extract, without any difficulty, a clot entirely free from adhesions); and so varied also as to their precise situation upon the arterial sheath and as to their size, that first-class observers (Cadenat; Moulonguet) have been unable to affirm with certainty that the lesions do not precede the "embolus."

To substantiate our dynamic hypothesis, therefore, we must explain how the blood can coagulate aseptically in an intact artery as a result solely of cessation of arterial pulsation. (This is the reason we have waited so many years before publishing.) Modern theories on blood coagulation explain the problem perfectly.

Coagulation: The possibility of coagulation *in situ* in a normal artery is contrary to the laws of classic physiology, which teach us that, to coagulate blood, it is first essential to liberate thromboplastin, which, by means of successive operations, produces a precipitation of fibrinogen; *but this liberation is a pathologic phenomenon, either infectious or traumatic.*

Modern knowledge of coagulation permits the explanation of aseptic coagulation in intact blood vessels. This possibility had been observed clinically in France by Laubry and Walser as far back as 1931. The fluidity of the blood is maintained by a *balance* between two antagonisms, the coagulative principles (thrombin and fibrinogen) being immediately destroyed (or neutralized) by the physiologic anticoagulant heparin, continually secreted by the Ehrlich mastzellens in the arterial wall of the vascular sheath Should heparin be added artificially the balance is destroyed, and the time of coagulation varies with the quantity of heparin If the heparin is missing and thrombin is injected, coagulation takes place all the faster, as the deficiency is greater

Heparin producing cells are situated in the arterial sheath No doubt arterial paralysis acts upon their physiology also The two conditions necessary to coagulation are thus united *a slowing down of the blood circulation and a disturbance of the heparin production* If the spasm is very violent and the heart gives way, coagulation is extremely rapid and extensive, if the spasm is less violent and the heart remains in good condition, circulation may be stopped but coagulation may be delayed long enough for suppression of the mysterious cause that brought about the dynamic disturbance

In intermediary cases it is possible that, if a small secretion of heparin still exists, the clot formed will not be adherent, owing to the slight anticoagulating action that persists If, on the contrary, all secretion fails, nothing can prevent the clot from adhering closely, practically becoming part of the normal endothelium, and this very speedily

Experimental Facts One great argument apparently contradicts the dynamic theory that of experimentation It would be difficult to deny concordant experimental facts reported by such well known research workers as Gosset, Bertrand and Patel and Fiolle and Haimovici While we do not deny these facts, we believe that their value lies in the interpretation given them, and what we wish to demonstrate is that the classic interpretation of these irrefutable findings is inadequate

Upon studying attentively the results obtained in cases of experimental embolus, one is struck by the extraordinary discrepancies of the phenomena noted both in animals and in human patients

We shall make a brief survey of the outstanding points, leaving the reader to look up further details in Haimovici's complete treatise on the subject

Seat of the Embolus: In animals, the embolus stops in an artery of the leg (tibial or crural) of which the size is appropriate to its volume, but never in the large trunks

In human beings, on the contrary, the embolus is often found in the main arteries of the system (particularly in our five cases), and the primary clot is so small that it cannot be located

Aspect of the Embolus: In animals the embolus once stationary, is not always accompanied by a prolonged clot (Gosset, Bertrand and Patel have never noted one within 24 hours)

Of 10 cases of *septic* embolus (eight in the axillary, two in the femoral) Haimovici noted no thrombosis of importance in six cases and a clot whose total volume was no more than two or three cc in the four others On the contrary, in each of seven cases of *septic* embolus, thrombosis extending downward was observed

As we have said, in the human being the prolonged clot is always present its immediate appearance and its size are quite out of proportion to those of the white clot (when it can be located) and in 80 percent of the cases the clot is *aseptic* However, the experiments of Gosset, Bertrand and Patel have revealed a most interesting fact—that the extensive thrombosis is more nearly related to the degree of blood coagulability than to "parietal irritation" or to the "center of intravascular coagulation" represented by the clot "In animals hirudinized prior to the embolus, this thrombosis is nonexistent " The rapidity of its appearance seems to depend principally on the state of hyper or hypo coagulation of the blood

Clinical Consequences of Embolus: In animals we have noted transitory pain chill and edema of the leg for three or four days and severe lameness lasting for a considerable time "On the other hand, sphacelus of the limb is exceptional out of 40 experiments, in some of which the subject was kept under observation for eight or nine days, necrosis of the paw was registered in only two cases, and these were exceptional—(nonaseptic), a large clot spreading from the crural arch to the thigh, and in the pelvis, reaching beyond the starting point of the deep femoral and thus blocking a considerable expanse" (Gosset, Bertrand and Patel). In human beings, with the exception of those with spontaneously cured embolus, gangrene and death are the usual termination.

Nervous Effects: In experimental animals, embolus causes no reaction of the sympathetic system accompanied by blocking of all collateral circulation. Haimovici attempted a complex experiment consisting of *distention* of the artery, but he obtained only a slight and transitory nervous reaction.

In human patients, on the other hand, the nervous disturbance is of prime importance. This has been demonstrated by Leriche, whose work shows that ischemia is not due to the progression of thrombosis in the collaterals (this was the theory emanating from past experiments made by Cruvelhier), but to the blocking of arterial circulation by truncular irritation. From this revelation sprang the great discovery of arteriectomy (Leriche), which, by suppression of the "pathologic plexiform nerve" from which the spasm originates (this being the obliterated arterial segment). puts an end to the inhibition suffered by the collaterals and restores circulation to the endangered limb. Thence, too, comes the possibility of purely medical treatment, the merits of which have been clearly demonstrated by Denk. This treatment is now widely used, thanks to the introduction of heparin and dicoumarin.

What is more, in human sufferers, the obliterated arterial segment, instead of being distended, is generally contracted.

Then contradictions are tabulated in the following way:

From the juxtaposition of these two series of facts we draw the following conclusion, which, in itself, appears astonishing:

The accidents observed in human clinics and known as arterial embolism are entirely different from the accidents provoked in animal clinics by experimental embolism.

If, on the other hand, we consider the dynamic hypothesis we have just brought forward, it must be admitted that only a very slight relation exists between accidents of nervous origin in human patients and experimental embolus in the animal. In animals we deal with a real, proved embolism; in man, we observe a mysterious sickness and most of the phenomena observed, as well as their discrepancy with experimental phenomena, are more easily understood in the light of the dynamic hypothesis than in that of embolism.

Practical Consequences: From these data we see that arterial embolism is but a pathogenic hypothesis derived from the fact that after a syndrome of acute ischemia a clot has been found in an artery. The conclusion is

COMPARATIVE DATA ON PERIPHERAL ARTERIAL EMBOLISM

Anatomic Findings	Experimental Animals	Human Beings
Seat of the embolus	In an artery of appropriate caliber	In the largest arteries of the root of the limbs (aortic bifurcation, iliacs, femoral, axillary)
Nature of the embolus	Experimental clot (no red clot)	Red clot (white clot usually not to be found)
Ascending thrombosis	Insignificant except with infection	Primordial and very extensive, usually aseptic
Nervous reaction	Nonexistent	Primordial, injuring the whole vascular system of the affected limb; liable to spread
Clinical results	Slight limping; never gangrene	Gangrene and death

drawn without hesitation that the clot is migratory in origin, but in most cases no proof of this can be given

We consider it truer to clinical facts and easier for practical deductions to separate the phenomena observed from all suppositions as to their manner of appearance The incontestable observations are as follows On the one hand, a particularly characteristic clinical syndrome (sudden pain, decrease of sensibility in the affected limb, ischemic signs or symptoms, rapidly progressing, with abolition of pulsations and oscillations, on the other hand varying anatomic or surgical findings, the artery being obstructed or free, its sheath modified or intact, the surrounding veins infected or free of infection We therefore consider it worth while to describe an anatomoclinical syndrome of acute ischemia of the limbs which may be attributed to various causes, arteritis (a pseudoembolic form of chronic arteritis), phlebitis, spasm, embolus, and even traumatism Whatever the origin may be, the same measures are to be advised

1 Medical action should be taken upon the spasmodic element and the coagulability *of the blood*

2 If the medical treatment gives no result, an operation should be attempted at a sufficiently early date

3 Only after surgical examination of the lesions should the most favorable type of operation be determined

MEDICAL TREATMENT

Medical treatment comprises the measures to be used against the spasm and also against the coagulation of the blood (1) papaverine and its derivatives acetylcholin, and novocaine infiltrations of the sympathetic system (lumbar for the lower limbs, stellar for the upper limbs), heparin and dicoumarol Allen recently wrote an excellent article on this subject

SURGICAL INDICATIONS

Classically an operation should be attempted at an early stage—before the lesions caused by the embolism have time to become irremediable i e, before endarteritis sets in and the ischemic lesions cause incurable gangrene These risks cause most authors to advise a delay of 10 hours after onset before intervention is begun

Favorable results of medical treatment over a period of 24 hours do not, however, permit so rapid a decision, and in our Case 1 the study of operative conditions confirmed this theory The operation took place 48 hours after the clinical onset Arteriectomy was carried out with great success, proving that no real gangrene had set in In Case 2 the operation took place five and one half hours after the onset, but no clot was found and the pulsations of the arteries resumed beating while we watched we might, without danger, have tried medical treatment for a few hours more, and perhaps the pulsations would have been revived by that means alone This treatment was not, however, so clearly defined at that period at it is now

In Case 4, although embolus had set in 48 hours previously, embolectomy was easy, there were no adhesions and, in spite of an "ideal" operation, the clinical result was nil (it is to be remembered that this was the first case in which we observed arterial paralysis persisting in spite of surgical intervention) In Case 4 an embolectomy carried out upon a patient in a state of complete collapse gave no result, although it was attempted only five hours after the onset

CHOICE OF METHODS

Study of the lesions revealed by examination of the obliterated artery must indicate the method to be chosen according to the case on hand, the operation should be embolectomy, arteriectomy, phlebectomy, phlebotomy, explorative arteriotomy or simple liberation In our personal cases we have had to use all of these methods

If the artery is visibly modified, hardened, or sheathed in adherences, no risk is run in resecting the thrombosed segment (Leriche's arteriectomy) Indeed, from the standpoint of truncular circulation, this intervention makes no change in an already existing condition Interruption of the circulation is definitive and will remain so But ablation of the "pathologic plexiform nerve" puts an end to the arteriolar spasm it causes and liberates the inhibited collateral circulation.

If the artery is only obliterated or if direct examination does not show it to be affected, *embolectomy* should be adopted and the prognosis is, from then on, fixed. If the blood following the clot flows red and strongly pulsing and if *the artery resumes beating*, success is nearly assured. If, on the contrary, the blood, though red, is but faintly pulsatile, and above all, if the artery does not beat after the insertion of an oiled probe far into its depths (to insure that no residual clot remains), failure is certain. This occurred in five of our cases.

In some cases, even after embolectomy, it is preferable to carry out an arteriectomy rather than to close the arteriotomy. Leriche advises this as follows:

1. When the arterial endothelium revealed by arteriectomy is impaired.
2. In cases of emergency (failing strength of patient).
3. When the condition of the surrounding tissues makes suturing difficult.
4. When thrombosis reappears immediately after suturing.
5. In cases of distinctly infected embolus (infected endocarditis).

Should sympathetic therapeutics be employed in conjunction with surgical intervention? "Certainly," says Leriche, "providing these cause no complication to the operation." As a matter of fact, the aim of periarterial sympathectomy is automatically the disclosure of the seat of arteriotomy.

If the iliac or the aortic bifurcation is laid open there is nothing to prevent incision of the sympathetic nerve, which is beside them, and only good can result from this incision.

Should anticoagulants be continued? There is certainly every risk of hemorrhage, and Swedish surgeons have published cases in which it occurred, though not fatally; in any case, it is wise to inject heparin into the artery itself before suture, and calking of the suture with thrombin plasma, whenever possible, is an excellent precaution.

In our opinion, a study of the arterial dynamic after the operation is the best means of solving these problems. If the pulsations have been revived, the operative prognosis is good and it is of no use to take these risks; if the pulsations have not been revived, the prognosis is extremely doubtful and every possible aid to success should be attempted.

RESULTS

Our own results have been as follows: nine operations, with four successes—arteriectomy, arteriotomy, embolectomy and liberation; and five failures with fatal termination (embolectomy).

The prognosis was determined by the reappearance or nonreappearance of the pulsations.

Comparison between the results of surgical intervention and those of modern medical treatment provides us with the following data:

In 1936, Key's statistics mention 382 cases of embolectomy performed by Swedish surgeons. These were 86 recoveries (22.5 percent); 227 deaths at various periods (60 percent); and 69 amputations (18.5 percent).

In 1947, Allen of the Mayo Clinic presented statistics on the results of modern medical treatment utilizing heparin and dicoumarin. Of 19 cases, treatment succeeded in 12 and failed in 70. None of Allen's patients were operated on, and this seems to us an exaggeration. He insists upon the necessity of commencing medical treatment at the earliest possible stage. Of 11 patients treated early, 10 were cured, whereas of eight treated after 24 hours, only two were cured.

This proves that the discovery of heparin has certainly modified the indications for surgical intervention; but, *on the other hand*, complete suppression of surgical treatment, which seems to be Allen's theory, appears unjustified.

Ramsdell's recent publication confirms this last proposition. Of nine patients operated on by himself, five made complete recoveries without impairment of the function of the extremity; one required a subsequent amputation and recovered, one died on the operating table, one died within 26 hours of operation, and one died 16 days after the operation, having refused amputation.

SUMMARY

We hope that a study of the cases here recorded, of similar cases published by other surgeons, and of our review of experimental

results will demonstrate the well founded reality of the dynamic hypothesis in the majority of accidents classically termed "embolic"

A disease consisting of disturbances of arterial pulsation certainly exists, associated with disturbance, and we are acquainted with the acute variety which attacks the arteries of the limbs The same may be said of the cerebral arteries for long since syndromes classically called "cerebral embolus" have been traced to a purely pulsatory source the arterial spasm It should be an easy matter to obtain similar data in respect to the syndromes known as "pulmonary embolus"

We may even let our imagination run further Since disturbances of arterial pulsation have been proved a cause of acute trouble what is there to prove that they are not equally a cause of chronic trouble? The progressive increase of the rate of urea in the patient in our Case 9 was most striking, coinciding as it did with the feebleness of his aortic pulsations This may, of course, be explained by stoppage of the circulation due to the gradual rising of the arterial paralysis, the exterior effects of which we were able to follow But this explanation itself would appear to elucidate the process of production of hypertension.

Goldblatt's method is the surest and also the most instructive of all those which have permitted the reproduction of experimental hypertension With the exception of one case of intra arterial calcified viola, it has never been possible, unfortunately, to apply the results of this experimentation to human disease The analogy may possibly be found rather in the variations of arterial motility, in a disturbance of the physiology of the renal arteries filling the role of the ring, which in Goldblatt's experiment, partially compresses *the pedicle The renal lesions would, in that* case be secondary and not primary—a consequence of partial renal ischemia, as experimentation has revealed

The chief interest of the idea submitted here lies in the possibility of discovering an entire new pathology of arterial pulsation and a resulting hypothesis of treatment The increased light they throw upon operative indications and methods, and the explanations they furnish on the subject of clinical results obtained by medical therapeutics are also though in a secondary degree, a justification for their publication

RIASSUNTO

L'A ritiene che taluni disturbi nella pulsazione delle arterie consistenti essenzialmente in fenomini spastici, spieghino non solo una sindrome acuta degli arti, ma anche sindromi cerebrali che vengono confuse con un embolo del cervello La stessa fenomenologia potrebbe essere estesa a talune sindromi polmonari, egualmente confuse con un embolo

La fantasia dell'A galoppa al punto da chiedersi se non esistono addirittura delle malattie croniche aventi la stessa origine

Avanza infine l'ipotesi che variazioni nella motilita' arteriosa risultanti in disturbi funzionali della arterie renali esercitino un'influenza nell'etiologia dell'ipertensione arteriosa Le lesioni renali sarebbero in tal caso secondarie e non (come negli esperimenti animali di Golblatt) primarie sarebbero la conseguenza di una parziale ischemia dei reni

SUMARIO

Existe una enfermedad del sistema arterial que se manifiesta por alteraciones del pulso *de dicha arteria Nosotros tenemos familiaridad* con la variedad aguda de estas alteraciones que atacan las arterias de las extremidades Lo mismo se puede decir de las arterias cerebrales que mucho tiempo fueron designadas "embolos del cerebro" y cuya causa es puramente el espasmo arterial Seria muy facil el obtener una data similar con respecto al sindromo generalmente conocido con el nombre de "embolia pulmonar" Si nos dejamos llevar por nuestra imaginacion un paso mas, es logico el deducir que asi como hay desfuncionalismos agudos del sistema arterial, *tambien debe de haber formas cronicas? El* incremento progresivo de la tara de la urea en nuestro caso # 9 es de gran significancia en vista de que este aumento coincidio con un pulso aortico debil Esto puede quizas explicarse a base de una paralisis arterial progresiva, los efectos exteriores del cual nosotros pudimos seguir Pero esta explanacion en si apareceria el elucidar el proceso de produccion de la hipertension

El metodo experimental de Goldblatt es el mas instructivo y el mas seguro de todos los procedimientos experimentales en la produccion de la hipertension.

Con la excepcion de un caso de virola intraarterial calcificada, aun no ha sido posible el aplicar el metodo y las observaciones de Goldblatt en el hombre. Quizas la analogia se puede encontrar en las variaciones de la motilidad arterial, en la disfuncion de las arterias renales que actuarian como un anillo constrictor, que en los experimentos de Goldblatt causa compresion del pediculo renal. La lesion renal seria en ese caso, secundaria y no primaria—es decir, la consecuencia de la isquemia renal parcial, tal como la experimentacion lo ha revelado.

SOMMAIRE

Une maladie dûe seulement à des dérangements de la pulsation artérielle, certainement existe. Nous sommes en présence de la varieté aiguë qui attaque les artères des extrémités. La même chose peut être dite des artères cérébrales longtemps, designeés "embolie cérébrale et qui sont dûes à une source purement pulsatoire: les spasmes artériels. Il devrait être facile d'obtenir le même renseignement en ce qui concerne les syndrômes connus comme l'embolie pulmonaire."

Vu que les dérangements des positions artérielles sont les causes aigües, qu'est-ce qui prouve qu'ils ne sont pas également les causes des dérangements chroniques? L'augmentation progressive du taux de l'urée chez le malade (cas 9) est frappante, coïncidant avec les faiblesses des pulsations aortiques. Ceci peut être expliqué par un arrêt de la circulation dû à une augmentation graduelle de la paralysie artérielle. Les effets externes que nous avons pu suivre devraient élucider les causes de l'hypertension.

Les méthodes de Goldblatt sont les plus sûres et les plus instructives de toutes celles qui permettent de reproduire de l'hypertension expérimentale. A l'exception d'un cas, il n'a jamais été possible, malheureusement, d'appliquer ces expériences à l'éxperimentation chez l'homme.

L'analogie peut être trouvé plutôt dans les variations de la motilité artérielle, dans le dérangement physiologique des artères renales qui remplissent le rôle d'anneau, qui dans les experiences de Goldblatt comprime le pédicule. Les lésions renales seraient les cas secondaires et non primitifs, une conséquence partielle de ischemie renale ainsi que l'expérimentation le révèle.

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Contribution to the Sympathetic Pelvic Plexus Development

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LEE in 1841, and Frankenhauser in 1867, described the cervical ganglion of the uterus and the two small vesical ganglions situated on the sides of the ureteral pelvis, which is now the basis of study for that part of the nervous system which presides over the innervation of the organs contained within the true pelvis. Since then other authors have been interested in this argument, but they have supplied only the first applications of surgical therapy in cases of rebellious pain of some pelvic viscera; therefore such studies have become more frequent until an exact knowledge of the autonomous pelvic plexuses has been reached, as we may see described in Testut and Latarjet's *Textbook of Human Anatomy.*

Yet for the need of modern physiological investigation and for the explanation of clinical cases, a morphological description of the pelvic sympathetic system, based only on the results of dissection, is not sufficient.

Today the experimentalist and the clinician must distinguish the sympathetic from the parasympathetic component in the nervous structure of the pelvis. It is difficult to reach such knowledge simply by application of the histological method, and, on the other hand, the experimental method meets with many technical difficulties, leading often to results requiring arduous explanations.

Therefore I thought it convenient to study the development of the autonomous pelvic plexuses, trying to collect some useful data on an embryological basis for a reasonable settlement of those nervous structures.

The embryological study in fact, illustrating the origin of the sympathetic plexuses, and in particular their dependency from the nerves which arise of the spinal cord, indicates, without any doubt, the nervous structure as related to one or the other subdivision of the sympathetic system (ortho- or parasympathetic). Moreover, it is well known that the cranial and sacral divisions of the neuraxis are in relation with autonomous plexuses of parasympathetic nature. But the participation of these divisions of the neuraxis at the formation of the autonomous plexuses is not established yet. Regarding the pelvic plexuses, the important contribution of the limiting cords to their formation is still uncertain.

Furthermore, to recognize the origin of the single constitutive parts of the sympathetic plexuses through embryological findings makes it possible, according to Terni, to determine indirectly the functional meaning of the various divisions of the autonomous system.

Only Bruni, Rossi and Silva, applying the method of silver impregnation according to Cajal, faced this argument.

Bruni (1916), studying the development of the sympathetic system of embryos of mammifers (rats) found that in the formation of the hypogastric plexus the spinal nerves of the pudendo femoral plexus have the greatest importance, as they furnish the former with cells and fibers, while the relation to the limiting cords is secondary, being limited to an indirect relation through the intermediary of the aortic abdominal plexus. The hypogastric plexus shows that a particular analogy to the opposite end of the trunk where (in case of mammals) the cervical sympathetic system is derived is chiefly from the vagus with elements added by the limiting cords.

Rossi (1929), in a work about the development of the abdominal and pelvic sympathetic nervous system in men, illustrates that the vesical rectal plexus shows an extraordinary extension, such as to occupy most of the space within the pelvic cavity. In the younger embryos he saw big tracts of nervous fibers (not only from the limiting cords but also from the sacro-spinal nerves) leading to the vesicorectal plexus.

In 1932, Silva wrote about the same argument, using human embryos and those of animals, and arrived at the following conclusion The hypogastric plexus develops independently from the rest of the sympathetic system, as it appears to be formed of nervous cells in more precocious stages than the former Up to the first stages of development, it is in close connection with the sacrospinal nerves from which it receives important contributions of *neurocytes The hypogastric plexus, besides* the cells from the parasympathetic divisions and those from the cerebrospinal sacral ganglions (which represent the most important contributions to its formation) successively receives cells from the sympathetic system through the presacral plexus and from the anterior branches of the ganglions of the sacral limiting cords Therefore this plexus should be considered as an important nervous parasympathetic center whose fragments, during the later development, provide all organs of the pelvis with fibers and cells These are so distributed that those of sacral origin find them*selves in the body of the hollow* viscera, while those of sympathetic function are placed at the level of the eventual sphincteric formations of the same viscera

PERSONAL OBSERVATIONS

I studied many embryos of mammals (guinea pig, 6 mm, C R, 7 5 mm, 12 mm 22 *mm, bat, 18 mm, all impregnated* with reduced silver, according to the method of Cajal, and other embryos like the ovis, mole, hedgehog, *vespertilio murinus and human once,* stained according to the common method) I will refer to the results deducted from the study of embryos impregnated according to the neurofibrillar methods

I recognized the first anlage of the pelvic plexus in embryos of guinea pigs (maximal length 6 mm) In the sagittal sections, which are more suitable to this object, a few groups of nervous cells appear which are evidently in close connection with the sacrospinal nerves At this stage of development, the plexus of the lumbosacral nerves is not yet organized in its definitive aspect Each of the roots is tending forward and lateral, but they still are separate among themselves These favorable conditions showed that most of the cellular groups are in relation with the second and third sacral nerve Such groups are condensed lateral and dorsal on the urogenital sinus, and are particularly developed near the terminal tract of the primary ureter in the angle formed by the same ureter with the posterior surface of the urogenital sinus and the lower extremity of Wolff's conduit (Fig 1) On the anterolateral surface of the aorta and its *caudal prolongation, the sacral middle artery,* nervous cells are assembled here and there in small groups of few elements They are the continuity of the primary limiting cords They have no relation to the spinal nerves and are completely detached from those groups of nervous cells which are situated in the vicinity of the primary ureter and the urogenital sinus

In this embryo, and in another one a little more developed (7½ mm), the anlage of the pelvic plexus shows some peculiarities of structure which deserve a careful examination Regarding the segments of the column I was able to establish that the anlage, in craniocaudal direction, comprehends the height of four to five vertebrae, and on the whole, the region in which it has its site is equal, roughly, to the whole extension of the true pelvis For a more exact and objective *estimate of the relationship* which establishes itself between the groups of nervous cells and the branches of the sacral nerves (especially *the second and the third nerve)* I *will report* briefly the results of my observations about these embryos in a stage of precocious develop*ment*

The localization of the neuroblasts in comparison to the spinal nerves is particularly interesting The origin of the sympathetic system is generally supposed to be elements which migrated from the medullary tube, along the anterior roots of the spinal nerves Regarding the anlage of the sympathetic system of the pelvis, let me emphasize that the material at my disposal did not allow me to observe the course of the spinal nerve cells which would show the neurofibrillar reaction Only in the neighborhood of the extreme terminals of the branches of the spinal nerves, the neuroblasts were assembled in small groups, but some of them were completely isolated within the mesenchyma without any relation,

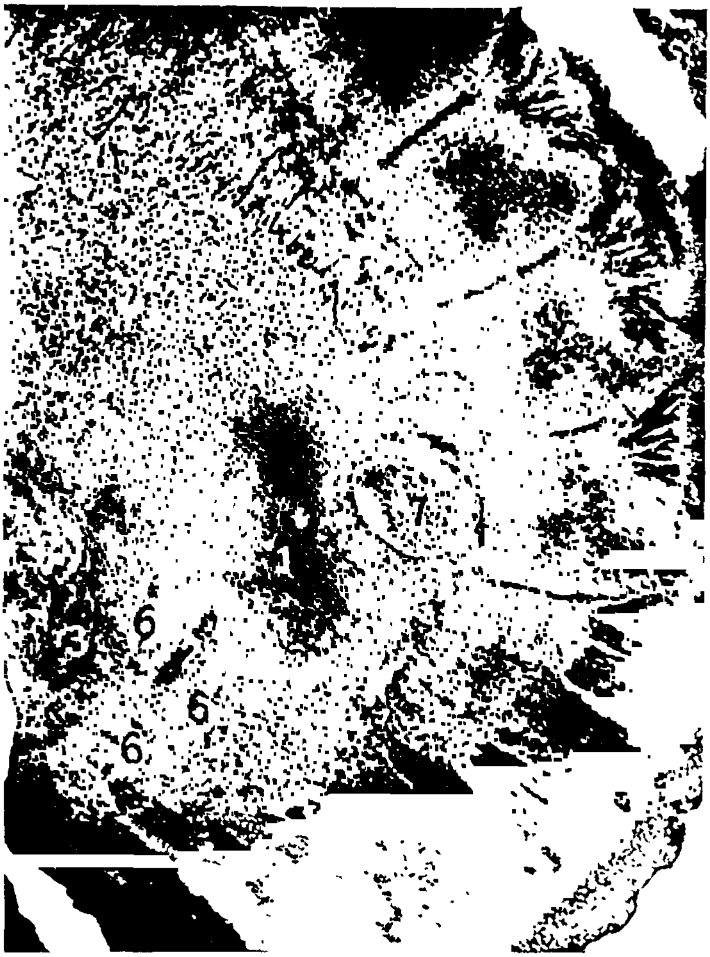

Fig. 1. Longitudinal section of a guinea pig embryo of 6.5 mm. C.R. (Cajal's method) microph. 65 x. Number 1 designates metanephron; 2. primary ureter; 3. urogenital sinus; 4. primary limiting cord (orthosympathetic) on the anterolateral surface of the aorta; 5 sacrospinal ganglion I; 6. groups of nervous cells which represent the anlage of the pelvic plexus (parasympathetic); 7. aorta.

even of neighborhood, with the ramifications of the above mentioned.

Without discussing the origin of the sympathetic, I think it convenient to state that whenever the neurofibrillar reaction is believed to be a specified one, in order to establish the certain nervous nature of the cells which may be traced out within the mesenchyma, it is arduous to support the migration of the sympathicoblastic material, along the sacral nerves. However, it may be said that the elements which are bound to form ganglions, migrate during a stage in which the neurofibrillar reaction is not present. Lacking the former, the only certain element to judge the nervous nature of the cells, which are situated along the course of the bundles, is missing. On the basis of these examinations and the data which I was able to collect through the study of my material, I am of the opinion that the supposition stated by Terni (to which other studies are in agreement), is the more probable; that the differentiation of the cells which are bound to form the ganglions occurs under the influence of the preganglionic fibers of spinal origin. That explains my and also Silva's finding: of groups of sympathicoblasts, situated exclusively in the neighborhood of the ramifications of the second and the third sacral nerve.[*]

Regarding the pelvic plexus, I did not succeed in identifying detached and well secluded anlagen of communicating branches which are *quite evident in the thoracolumbar sympathetic* There exists instead, on the extremity of the sacrospinal nerves (in particular the second nerve), a fanlike filament which divides *a part of the nerve in small bundles directed* mediad In the neighborhood of such bundles can be found most of the groups of nervous cells which, all together, form the pelvic sympathetic system

The guinea pig embryo of 12 mm is in the stage of precocious development The study of the pelvic plexus, as far as it concerns its origin and relations, confirms the data met with in the foregoing embryos The nervous cells which compose it appear to be of considerably more advanced differentiation than those of the other sections of the sympathetic Many of them are at the pluripolar stage, some in starlike or triangular form The prolongations extend themselves to a distance equivalent to three or four times the cellular body whose interior shows a neurofibrillar structure, not very thin, only peripheral

In the guinea pig embryo of 22 mm, sectioned sagittally, the plexus appears extended *to nearly the half of the space included be*tween the first sacral vertebrae and the anlage of the pubes On the whole, and seen from the side, it has, roughly, the form of a half moon with the concavity turned anteriad (Fig 2) The upper horn of this half moon laterally surrounds the rectum and leads laterad, to the surface of the bladder, while the lower horn surrounds the terminal extent of the rectus and pushes itself into the more distal part of the urogenital sinus This embryo shows clearly the communicating branches well separated, they arise from the second, third and fourth sacral root After having covered a short, anteromediad distance they fuse into a single trunk which ramifies in the middle of the central part of the pelvic plexus Such *a trunk represents the first anlage of the* erector nerve (pelvic nerve) The sections, near the medial sagittal plane, show ramifications of the plexus on the ventral surface *of the rectus, forming there a ganglionic mass* interposed between the rectus and the bladder from this, a great number of branches are left which are bound mostly to the vesical wall

Regarding the connection of the pelvic plexus with the preaortic sympathetic and with the latero vertebral chain, I observed as follows the celiac ganglion appears like a very bulky mass and of irregular shape, provided with a ramification which is directed caudalward From it arises a strong cord of fibers which, beneath the peritoneal serosa and medial to the ureter, leads downward, reaching the upper extremity of the pelvic plexus Here they become filascious forming few small branches which can be followed to the more distal parts of the plexus During the course of the mentioned cord, some small sympathetic ganglions are intercalated, mainly in the neighborhood of the pelvic plexus They show the same structure as those of the latero vertebral chain and differ from the pelvic plexus, which is formed mostly of more differentiated and more stained cells because of *the lesser staining and the differentiation* which is less progressed Also the way to group cells of the pelvic plexus is different from that of the ganglions which are connected with the preaortic cord The first ones are assembled in groups of few elements which hold together The fibrous tract which rejoins the many small groups gives to the whole a reticular aspect The sympathetic ganglions are more dense in regard to cells and also more compact and more voluminous and generally disposed in order to form a sort of rosary For these reasons the upper aspect of the pelvic plexus, richer in orthosympathetic elements, differs remarkably from the aspect of other regions of the pelvic plexus

The cord, arising from the celiac ganglion and the connected ganglionic cumuli, represents the preaortic, sympathetic system (primary limiting cord) Its upper portion in adults is relative to the so called presacral nerve

I did not state direct connections of the latero vertebral chain with the pelvic plexus in spite of repeated observations of material in which the silver reaction was perfect. But I noticed that beneath the celiac ganglion, on the level of the first lumbar vertebrae, important anastomotic tracts exist which rejoin the latero-vertebral chain with the preaortic sympathetic. Neither in the lower part of the column nor along the whole sacrum where the sympathetic chain is already present and well developed, does any connection with the pelvic plexus exist.

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CONCLUSION

The fibers of orthosympathetic nature reach the pelvic plexus exclusively through the preaortic sympathetic system. The more cranial, ganglionic groups of the pelvic plexus mix with those ganglionic groups which were intercalated during the course of the preaortic sympathetic in evident continuity with the lower pole of the large celiac ganglion.

In the guinea pig of 25 mm. sectioned transversely, the pelvic plexus looks like a triangle with the anterior base and the posterior apex toward the rectum. In more caudal divisions the apex becomes bifurcate and while one ramification keeps in contact with the rectum, the other leads mediad, along the postero-inferior wall of the bladder and is

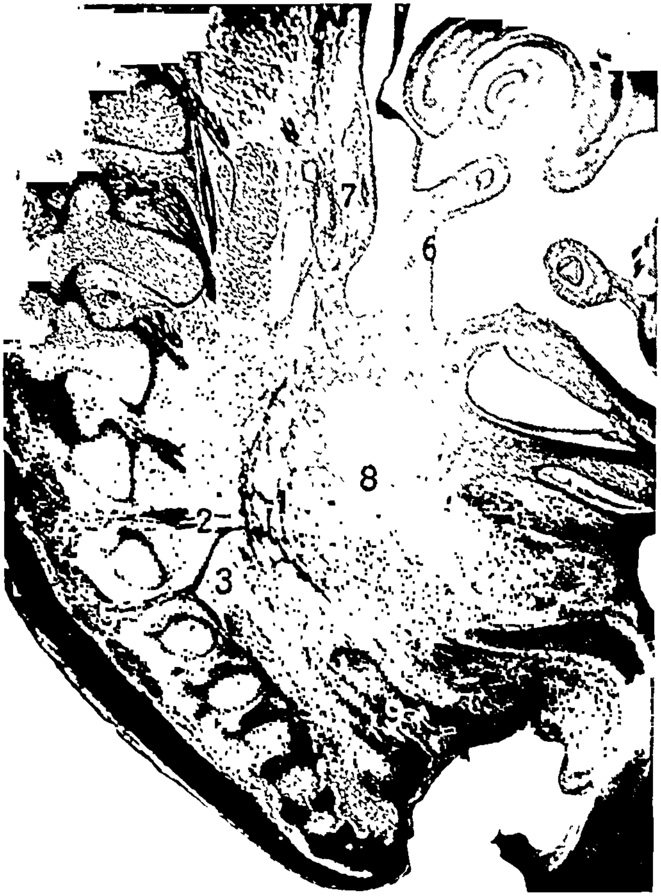

Fig. 2. Longitudinal section of a guinea pig embryo of 22 mm. C.R. (Cajal's method) microph. 25 x. Number 1 designates pelvic plexus on the lateral surface of the rectum; 2 and 3 are communicating branches of the second and third sacral nerves which represent the anlage of the erector nerve (or pelvic nerve); 4 and 5 are sacrospinal ganglions; 6. urogenital fold; 7. ureter; 8. urinary bladder; and 9. rectum.

crossed by the genital conduits which lead into the urogenital sinus

In the guinea pig of 30 mm also sectioned transversely, the pelvic plexus has the form of an H whose lateral poles proceed externally along the viscera of the pelvis Meanwhile the junctional tract goes posteriorly toward the basis of the bladder, there the Mullerian and Wolffian ducts are already joined leading into the same bladder The branches arising from the sacral roots are evident but the afferent sympathetic branches can be seen clearly Observing the divisions on the level of the celiac ganglion and of those in a more caudal position two large nervous bundles are seen which include formations of developed ganglions placed ventrally and laterally to the aorta, and medially to the ureter The ganglions of the preaortic sympathetic chain (largely anastomosed between themselves and also supplied with anastomosis in regard to the laterovertebral cords), are nearly fused at the height of the last lumbar vertebra In front of the first sacral vertebrae these nervous bundles deviate from the median line and continue in the posterior part of the pelvic plexus

According to the embryological observations reported it is possible to confirm that the pelvic plexus in precocious stages of its development appears well formed as the only nervous center, which in its more advanced stages of the ontogenesis, gives origin to secondary ganglionic formations in the neighborhood of the viscera and in the structure of the same viscera But these formations always keep in close connection with the primary ganglionic center These subdivisions of the pelvic plexus (which at the beginning are single) are in the secondary plexuses described separately in the sexes, evidently a consequence of the form changes and relations which the viscera undergo in the pelvis in both sexes

At the beginning it is of parasympathetic origin and only later evident connections are established with the limiting cords I thought it convenient to insist upon the primary genetic independence of the pelvic plexus from the sympathetic limiting cords because such independence confers a well defined embryonal peculiarity and determines some functional characteristics of the adult As it results from the analytic description, the orthosympathetic supply reaches the formations of the autonomic plexuses successively and remains limited to the upper portion The total results of my observations approve and extend the studies made by Bruni and Silva

SUMMARY

Physiology and pathology agree in attributing the preeminence, regarding the motor and sensitive power of the pelvic viscerae, to the parasympathetic component However, let me state that the effects on the sensibility and on the motorial function of the pelvic viscera which are obtained by resection of the pelvic nerves (erector nerves) are considerably more evident and more constant than the effects caused by interruption of the orthosympathetic fibers (presacral nerve) Also the application of epidural sacral anesthesia which suspends the conduction of the preganglionic and sensitive fibers designed to the pelvic plexus has proved the positive predominance of the parasympathetic component regarding the functional manifestations of the plexus in question

The embryological observations performed by myself support this point of view In precocious stages the anlage of the pelvic plexus is represented by a ganglionic mass, scattered, and in relation to the sacrospinal nerve In more advanced stages, connecting branches become evident which lead from the sacral nerves second, third and fourth, to the pelvic plexus They are the anlage of Eckhardt's erector nerves The orthosympathetic supply is of secondary importance and is established very late It is furnished by the preaortic sympathetic chain to which arrive anastomotic branches from the first ganglions of the lumbar laterovertebral cord

At the beginning the ganglionic center is single With the successive development of the pelvic viscera this ganglionic mass fragments and there are formed, astride of the viscera, secondary ganglions which keep in connection with the pelvic plexus Also after further research it was not possible to report viae in immediate connection between the pelvic plexus and the lumbar latero vertebral and sacral cords perhaps, because these viae are established in later periods of development

RIASSUNTO

I dati ricavati dalla fisiologia e dalla patologia depongono a favore di una prevalenza del parasimpatico nell'azione spiegata sulla motilita' e sulla sensibilità degli organi pelvici. Gli effetti della resezione dei nervi pelvici (n. erettori) sono infatti molto piu' evidenti e piu' constanti di quelli consecutivi all'interruzione delle fibre ortosimpatiche (n. presacrali). Anche l'anestesia epidurale sacrale, la quale sospende la conduzione delle fibre preganglionari e sensitive destinate al plesso pelvico, depone per un'effettiva prevalenza del parasimpatico sopra l'attivita' funzionale di questo plesso.

Gli studi embriologici eseguiti dall'A. apportano un'ulteriore confema a questo punto di vista. Nelle fasi molto precoci l'abbozzo del pleso pelvico e' rappresentato da una massa ganglionare diffusa, in rapporto con il nervo sacro-spinale. In fasi piu' avanzate, fanno la comparsa dei rami comunicanti che dai nervi sacrali (2°-3°-4°) si dirigono verso il plesso pelvico. Questi sono i futuri nervi erettori.

L'innervazione ortosimpatica e' molto piu' tardiva. Deriva dalla catena simpatica preaortica, alla quale arrivano rami anastomotici forniti dai primi gangli del cordone lombare latero-vertebrale. Il centro ganglionare e' dapprima unico. Col successivo sviluppo degli organi pelvici questo centro si frammenta: si formano così dei gangli secondari che si mantengono in rapporto con il plesso pelvico.

SUMARIO

Los datos fisiologicos y patologicos estan de acuerdo en darle pre-eminencia al poder motor y sensitivo de las visceras pelvicas al sistema parasimpatetico. Los efectos sobre la sensibilidad y sobre la funcion motora de los organos pelvicos, que se obtienen por la reseccion de los nervios pelvicos (nervios erigentes) son mas evidentes y mas constante que los efectos resultantes de la interrupcion de las fibras orto-simpaticas (nervio pre-sacral). Tambien la anestesia epidural de la region sacral que suspende la conduccion nerviosa de las fibras pre-ganglionares y sensorias del plexo pelvico, prueban la pre-eminencia positiva del sistema parasimpatetico sobre las funciones de este plexo.

Mis observaciones embriologicas soportan este punto de vista mio. En estados precosos, el anlage del plexo pelvico esta representado por una masa ganglionar que esta en relacion con los nervios sacrospinales: segundo, tercero y cuarto. En estados mas avanzados se ven ya ramas conectando estos nervios con el plexo pelvico. Estas ramas son los anlages de los nervios erigentes de Eckhardt. La inervacion orto-simpatica es de importancia secundaria y aparece mucho mas tarde en la ontogenia. Este se deriva del gran simpatico pre-aortico y recibe ramas anastomoticas de los prmeros ganglios del cordon latero-vertebral de la region lumbar.

Al principio el centro ganglionar es singular, pero con el crecimiento de los organos pelvicos, este se fragmenta, formando asi, ganglios secundarios en relacion con los organos y manteniendo sus conecciones con el plexo pelvico.

SOMMAIRE

Les donneés physiologiques et pathologiques s'accordent pour attribuer la préemience en ce qui concerne le pouvoir moteur et sensitif des viscères pelviens au parasympathique, Ne anmoins, les résultats sur les effets sensitifs et les fonctions des visceres pelviens obtenus par la résection des nerfs pelviens (nerfs érecteurs) sont considerablement plus évidents et plus constants que les effets causés par l'interruption des fibres orthosympathiques (nerfs présacrés) Aussi l'application de l'anesthesie épidurale sacrée qui suspend la conduction des fibres préganglionaires et sensitives desfineés au plexus pelvien prouve la prédomi nance du parasympathétique sur les rapports des fonctions du plexus en question.

Les observations embryologiques supportent ce point de vue dans l'état embryoonnaire. A l'etat précoce, le plexus pelvien est representé par une masse ganglionaire éparpilleé et en rapport avec le nerf sacrospinal. Dans les états les plus avancés, des embranchements conjonctifs sont évidents. Ils menent aux nerfs sacrés: second troisième et quatriéme au plexus pelvien. Ce sont les anlages Echardt des nerfs

électifs L'orthosympathétique est secondaire comme importance et est établi tardivement Il est fourni par la chaine sympathique préaortique dans laquelle pénetrent les premiers ganglions de la corde lombaire latérovertébrale

Au commencement le centre ganglionnaire est solitaire Avec le développement successif des visceres pelviens, cette masse ganglionnaire se fragmente et des ganglions secondaires en connection avec le plexus pelvien sont formés sur les viscères

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Vagotomy in the Treatment of Peptic Ulcer*

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ONE of the major conquests of modern surgery is represented by the physiologic orientation that decries demolitions except when unavoidable and guides the treatment of surgical disease toward elimination of the initial, presumable or ascertained causes thereof. At present the treatment of gastroduodenal ulcer tends to reject demolishing operations as far as possible and leans toward more conservative procedures, such as vagotomy.

In 1943, bilateral transthoracic vagotomy was performed as the method of choice for the treatment of gastroduodenal ulcer by Dragstedt, who deserves the credit for giving this procedure a physiologic basis. He aroused the interest of surgeons throughout the world to such an extent that no surgical center exists today which has not contributed something to vagotomy. But it is worthy of note that, many years before Dragstedt, numerous surgeons had successfully performed vagotomy though the abdomen, as a resection of the neural rami of the stomach. Owing to prejudice and the scarcity of controls, and perhaps because of insufficient interruption of the vagal rami, the various methods proposed did not attract wide attention and for the most part were abandoned.

However, Dragstedt wisely insisted upon study of the clinical and experimental influence of vagotomy and of its proper uses. He also created a technic for vagotomy by a thoracic route, pointing out the necessity for permanent and total interception of the two nerves. This technic is called the Dragstedt operation.

Kuttner, in 1912, was the first to propose and perform vagotomy in the treatment of tabetic gastric crisis; other surgeons followed. Cotte, Latarjet, Wertheimer, Thomse, Baron, and Curtis performed vagotomy for the same symptoms. Among the first surgeons who employed this procedure to relieve the pain of peptic ulcer were Wertheimer and Latarjet in 1922.

In 1911, Schiassi emphasized the importance of the nervous system in the pathogenesis of peptic ulcer, but he attributed equal importance to the vagus and the sympathetic system. This author had then proposed, as a treatment for ulcer, the sectioning of all the nervous branches in the small epiploon.

Pieri, in 1927, pointed out that the vagus nerves are vitally important in the pathogenesis of peptic ulcer. He advised and performed bilateral transthoracic extrapleural resection of the vagus nerves in the upper part of the diaphragm, obtaining, in most cases, excellent results. In 1931 this author abandoned the transthoracic route, which was difficult and dangerous, for the abdominal infradiaphragmatic route. Pieri, the Italian surgeon, who for many years defended vagotomy for the treatment of peptic ulcer, remained isolated and was not followed by the various Italian schools of surgery.

PHYSIOLOGIC AND PATHOGENIC CONSIDERATIONS

The indications for bilateral vagotomy in the treatment of peptic ulcer have a physiologic and a pathogenic basis, which may be summarized briefly.

In relation to meals, gastric secretion includes three periods: 1. A psycho-reflex period (studied by Pavlov) in which the nervous impulse is transmitted to the stomach glands from the brain center through the vagus nerves before the meal is begun. (This takes place also in fictitious meals). 2. A gastric period, in which the stimuli are furnished by the food, which directly stimulates the antral cells, so that the secretory substances, which stimulate the cells of the main portion of the stomach and those of the fundus ventriculi, are set free. 3. The final period, in which complex factors operate.

There exists, independently of meals, a

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continuous gastric secretion due to stimuli transmitted through the vagus nerves

In Dragstedt's researches on human subjects, bilateral vagotomy completely suppressed the psycho reflex phase, and the continuous secretion left the chemical and intestinal extravagal phases unaltered, these are carried out independently from the central nervous stimuli, because they are locally and specifically stimulated by the food ingested

These new conditions, determined by vagotomy, were put into evidence by one of the tests Abolition of the vagal phase of gastric secretion is demonstrated by the absence of secretory reaction to pilocarpine, to insulin and to fictitious meat

The preservation of the extravagal phase of secretion is made evident by the unchanged reaction to histamine and caffeine Dragstedt attributes great value to the suppression of the vagal phase and especially to the continuous night secretion obtained by bilateral vagotomy in cases of peptic ulcer during the healing process Research carried out in this clinic by Bergonzelli and Givogre have demonstrated a temporary decrease of gastric secretion in patients with both vagus nerves severed and have shown that the acidity tends to rise without ever reaching the preoperative values Furthermore, when vagotomy is associated with gastro entero anastomosis, my associates and I have observed low acidity persisting because of a reflux of bile and pancreatic juice from the neostoma

The vagus is not only a secretory nerve, it is also a motor nerve In reference to the motility and tone of the stomach, bilateral vagotomy is followed by a transitory gastric atony and a decrease of the number and degree of stomach contractions Motility is not completely lost, probably because of an automatic gastric action due to the intrinsic innervation of the organ Also, Dragstedt agrees with a long held opinion that certain stimuli starting from the brain cortex and passing through the cerebral nervous system, play an evident role in the pathogenesis of peptic ulcer After noticeable and repeated psychic trauma, as observed during the recent war, a certain number of stimuli passing through the hypothalmus and the vagus nucleus arrive at the stomach by means of the vagus nerves This causes vascular and trophic disorders that favor the erosive action of gastric juice on the mucosa of the stomach

Cushing and Grant have observed that, after operations performed on the central nervous system and the mesencephalon, the occurrence of a peptic ulcer was followed by acute perforation Rivers, Meroult, and Krerchman insist on the importance of psychic trauma in the genesis of ulcer According to Mechels, Mohin, Boblin, and Wenkedstern and Ormings, ulcerous persons are also vagotonic

In the light of these physiopathologic observations, it becomes apparent that vagotomy promotes two conditions of great importance in the healing of peptic ulcer (1) reduction of the secretion of gastric juice, especially the continuous secretion that, according to Dragstedt, represents the most irritating factor, with consecutive decrease in digestive power, and (2) decrease of muscular tone

Decrease of the digestive power of gastric juice favors the healing of the ulcer Reduction of muscular tone is very important in the healing process, because it abolishes periulcerative spasm and its sequela, irritation Stasis and edema, which cause greater elevation of the cords and prolonged retention of food in the ulcer cavity, cause fermentation and continuously irritate the ulcer

From the histologic point of view, interesting research has been conducted by Fogliati and Ruffo on changes of the gastric mucosa after vagotomy, due to histamine treatment Their studies demonstrate definite reduction of the mucosa, an increase of its connective stroma and a minor development of mucous epithelium The same authors also have observed a reduction of the volume of the delo form and adeloform cells of the gastric glands together with a numerical decrease of granulations, which represents the process of secretion

Experiments on laboratory animals in which an experimental hyperacidity had been produced and prolonged by the administration of histamine hydrochloride (1 gr per dose for 30 to 40 days), showed that vagotomy had resulted in a regression of vagus secretory hyperactivity as compared with the same activity in animals not vagotomized They observed a rapid regression of gastric symptoms in all of their anatomopathologic studies. These results illustrate the mechanism through which bilateral vagotomy affects the acid secretory activity of the stomach. The duration of action of this mechanism is not known, because of the short time during which vagotomized patients have been observed.

However, with knowledge of the pathogenesis of peptic ulcer and the action of vagotomy upon the secretory and motor functions of the stomach, it is justifiable to consider the mechanism of healing cleared after surgical treatment. All authors who have studied this treatment report a high percentage of recoveries.

INDICATIONS AND CONTRAINDICATIONS

Bilateral vagotomy has precise indications. It is essentially a procedure for recent ulcers and for ulcerous gastritis in young persons who have a noticeable increase of gastric acidity. If employed for callous ulcers, it makes deep anatomic changes in the gastric or duodenal wall. These are at first inflammatory and then cicatricial, especially when they follow stenosis. If there is any evidence of neoplastic degeneration, this operation is contraindicated. With regard to stenotic peptic ulcers, Dogliotti always combines gastro-entero-anastomosis with vagotomy.

According to some surgeons, if there are no indications for radical surgical intervention (in which case it is preferable to proceed to the typical gastric resection at the end of the hemorrhage) vagotomy is indicated. Resection is necessary in emergency cases because, hemorrhagic ulcer and hemorrhagic gastritis being clinically and roentgenographically indistinguishable, other indeterminable factors become evident, so that radical intervention is the preferable course of action.

The indications for vagotomy are connected also with the site of the ulcer. Consider, for example, a peptic ulcer situated high in the smaller curvature and especially in the fundus ventriculi. Whatever anatomopathologic aspect it may have, unless there are strong evidences of neoplastic degeneration, vagotomy is especially valuable in its treatment, as preventing the need of total or partial gastrectomy through the thorax. In fact, it is in such cases that I have had the best results.

Vagotomy is indicated also for peptic ulcer of the smaller curvature or of the antrum, which have the aforementioned characteristics. I believe that it should be adopted for the treatment of nonstenotic duodenal ulcer. This is contrary to the opinion of Delannoy, who advises not only partial external vagotomy but removal of the first part of the duodenum with the aim of eliminating eventual stimulating factors, starting in the duodenum, which are the causes of postoperative jejunal ulcer. My experience does not coincide with Delannoy's, for I have had excellent results with vagotomy.

According to Pieri and Dogliotti, bilateral vagotomy is most definitely indicated for jejunal ulcer occurring after gastro-entero-anastomosis and for peptic ulcer not cured by simple gastro-entero-anastomosis, either when this surgical procedure alone is performed and there are no deep alterations of the gastric or jejunal walls and no stenosis of the neostoma, or as an auxiliary procedure in partial resection of the ulcer and subsequent restablishment of a wide gastroduodenal anastomosis.

Some authors believe that in cases of covered perforated ulcer vagotomy alone is indicated, not only because it gives good definitive results but because it obviates resection, which takes much time and is difficult to perform.

Unless neoplastic degeneration is evident, these opinions can be followed safely in reference to peptic ulcer in the small epiploon or in nearby organs. They are hazardous, however, with regard to duodenal perforated covered ulcer, for this condition is usually followed by stenosis. For this reason I almost always combine it with gastro-entero-anastomosis. For perforated peptic ulcer in the free peritoneal cavity, my associates and I almost invariably perform gastric resection. Operation involving suture and partial excision of the ulcer, with or without gastro-entero-anastomosis, combined with bilateral vagotomy, are not considered by us, because in this manner we cannot eliminate one of the most important factors of failure; an infective focus is left, which sometimes is not sufficiently drained, and this can easily be followed by severe local and general complications.

Vagotomy is indicated for gastroduodenitis, periduodenitis, gastralgia of uncertain origin and inoperable carcinoma of the stomach diagnosed by exploratory laparotomy

Bilateral vagotomy is definitely contraindicated for ulcers showing clinical, roentgen or macroscopic evidence of neoplastic degeneration In the presence of these manifestations, subtotal gastrectomy should be performed at once Bilateral vagotomy alone is contraindicated for pyloric stenosis, as I have mentioned before, but it is indicated if performed in association with gastro enterostomy I have already mentioned the contraindications for vagotomy in the treatment of hemorrhagic ulcers that have perforated into the free peritoneum Vagotomy may be contraindicated when other extragastric infections are associated with peptic ulcer, such as diabetes, magacolon and certain biliary conditions

Of the patients with peptic ulcer observed during the past 10 years, few came under observation in such a condition that simple bilateral vagotomy was ideally indicated In most instances there were complications—extensive inflammatory or cicatricial changes in the gastric or the duodenal wall, stenosis, covered perforations previous hemorrhages, etc These circumstances make me doubt whether vagotomy alone will be completely successful

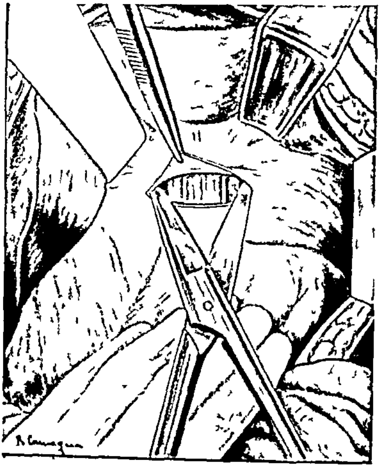
Dogliotti agrees, advising that in all cases one should combine bilateral vagotomy with gastro entero anastomosis This prevents gastric stanching due to hypotonia, which always follows bilateral vagotomy This condition can also be controlled in most cases by continuous gastric aspiration for four to five days, as has been proved by periodic emptying of the stomach There are cases, however, in which stanching persists for a long time after the operation and is controllable only by gastro entero anastomosis, or resection

Finally, gastro entero anastomosis, as was demonstrated by extensive research when it was the most popular operation for the treatment of peptic ulcer, completes the effect of bilateral vagotomy on gastric chemistry, assures a more rapid evacuation of the stomach and contributes to a quicker and more stable healing of the ulcer I mention chemistry because of the reflux of pancreatic juice and bile into the stomach through the neostoma and also because of the residue of gastric acidity which is due to automatic secretion under the direct stimuli of food proteins during the digestive period It is the only secretion not under the influence of the vagus nerves that is neutralized

On the other hand, vagotomy, considering all that has been said of the physiology of the vagotomized stomach, the well known complications of gastro entero anastomosis, such as postoperative jejunal ulcer the persistence of the old peptic or duodenal ulcer with its eventual acute complications, or the development of new peptic ulcers, especially in the duodenum Patients treated by the combined procedure show much better results than do those on whom vagotomy alone is performed

TECHNIC

Bilateral vagotomy can be performed by



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either the thoracic or the abdominal route. After a few patients had been operated on in our clinic, we completely abandoned the thoracic route and advised the abdominal subdiaphragmatic route (Figs. 1-4). All adverse criticism of subdiaphragmatic vagotomy has been discredited. It has been demonstrated by Bradley, Smally, Winsol and Walters, after extensive anatomic research carried out on 100 cadavers, that in 90 percent of cases bilateral vagotomy was accomplished more completely by the abdominal than by the thoracic route. However, the result may be incomplete because, instead of finding well-constituted trunks, one may find plexiform structures consisting of rami, more or less numerous and not always easily identifiable.

Therefore, from the anatomotopographic point of view and so far as perfect results are concerned, the route selected is a matter of indifference. Vagotomy by the thoracic route, however, is a far more serious operation than is vagotomy by the abdominal route. Not only does it require special apparatus, especially in administering the anesthetic, but it is more dangerous to the patient.

The thoracic route (and this is the most important criticism) does not allow the surgeon to explore the stomach and therefore may tempt him, in spite of clinical symptoms and preoperative roentgen evidence, to perform vagotomy on a patient for whom subtotal gastrectomy is obviously indicated, as in the case of neoplastic degeneration of the ulcer. This danger is avoided if the abdominal route is used. Last but not least, the frequent necessity of combining vagotomy with gastro-entero-anastomosis makes it impossible to use the transthoracic route.

The preparation of a patient for this operation does not differ from the usual methods. Prophylaxis of possible infective complications is impossible; therefore antibiotics should be given in advance. The administration of atropine immediately before operation has no great importance and can be omitted without any inconvenience worth mentioning.

In the majority of operations I used peridural segmental anesthesia (after Dogliotti) in the seventh and eighth dorsal intervertebral spaces, with 80 cg. of novocaine in 30 cc. of a water solution with adrenalin. With this method I have been able to obtain complete muscular relaxation and abdominal silence, which is difficult to obtain by other anesthetic methods and which greatly facilitates performance of the operation.

In some cases, when a certain amount of muscular contraction was present, I gave ether and curare. In the remaining cases the operation was performed, according to the indications, with the patient under either spinal or general anesthesia If I foresaw difficulty in reaching the esophagus because of the anatomic formation of the base of the chest or of other regions, the operation was performed with the patient under basal narcosis and completed with the administration of curare.

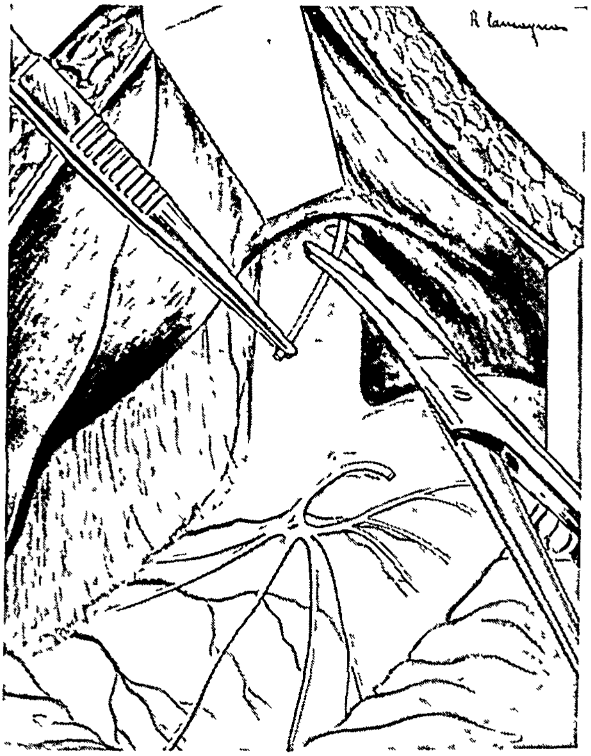

Fig 2. Bilateral vagotomy performed by the abdominal subdiaphragmatic route. Schematic representation of resection of the anterior vagus nerve with removal of a section of nerve.

I have followed this technic for abdominal subdiaphragmatic vagotomy; median supra-umbilical laparotomy performed as high as possible In my opinion resection of the xyphoid, as proposed many years ago by Pieri, is useless It has also been unnecessary to make the temporary incision proposed by Dragstedt, after opening the upper part of the abdomen and stretching the laparotomy incision An assistant, with a flat and possibly illuminated spatula, should push the liver toward the thorax on the right and against the diaphragm The surgeon pulls the upper part of the stomach toward the inferior part of the abdomen in order to repair the abdominal part of the esophagus When the left lobe of the liver is well developed, it is advisable to mobilize it by incising the full length of the triangular ligament

Generally this incision is not needed and it is only necessary to incise transversally the peritoneal reflexive cord from the inferior surface of the diaphragm to the anterior surface of the esophagus Then the lower part of the abdominal esophagus is mobilized further in order to uncover as large an area as possible toward the highest part of the abdomen, pushing all the other surrounding formations especially the diaphragm, toward the upper part I then try to locate the vagus trunks, which frequently appear well formed and are easily located These are isolated from the loose surrounding connective tissue If the trunks are already divided into rami, a thorough search is carried out for these rami in the periesophageal loose cellular tissue of each side, thus illuminating the muscular tunic

Before the vagus nerves are sectioned, atropine, injected as an anesthetic solution, produces negligible results After separating the vagus nerves from the esophageal wall and cutting them with a scissors, first the left and then the right, Dogliotti prevented regeneration by the following method The two inferior vagus nerve stumps were isolated downward as far as possible, then they were bent and fixed with a stitch to the peritoneum of the anterior gastric wall at the farthest point possible from their sectioned surface

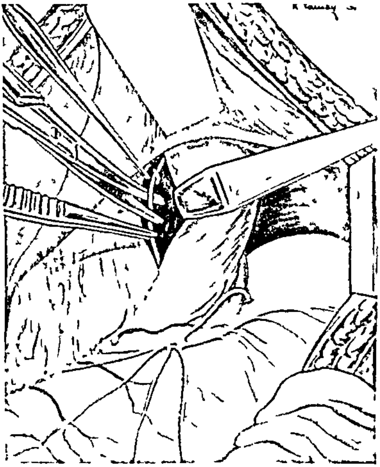

Fig 3 Bilateral vagotomy performed by the abdominal subdiaphragmatic route Schematic representation of resection of the posterior vagus nerve with removal of a section of nerve

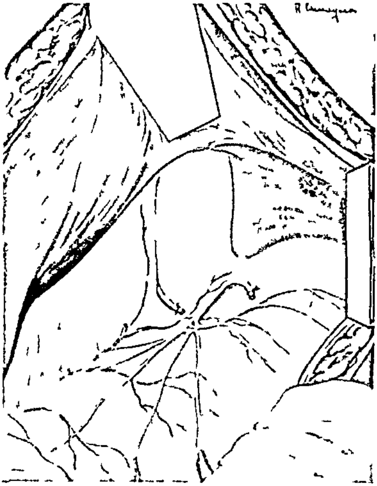

Fig 4 Bilateral vagotomy performed by the abdominal subdiaphragmatic route After the resection of both vagus nerves the two distal stumps are folded back and fixed to the anterior peritoneum of the stomach with a stitch to avoid nerve regeneration

The upper stumps were resected for 2 to 3 cm. and were left without further treatment (Figs. 3 and 4).

I then inspect the esophageal wall to be sure that I have not left any rami originating from the upper vagus nerve trunks, as sometimes is the case, especially with the right vagus nerve. Vertical transmesocolico-gastro-entero-anastomosis is performed in a short intestinal loop by the method of Hacher, Petersen and Moynihan. Each layer of the laparotomy incision is then sutured.

Postoperative treatment is not of special interest, since gastro-entero-anastomosis is a useful prophylactic against distention of the stomach. Only in a few cases was it necessary to use continuous aspiration or periodic emptying of the stomach with a stomach tube. In these cases I had chosen a bilateral vagotomy without gastro-entero-anastomosis.

RESULTS

I have operated on 70 patients in this clinic by the method described. Their cases are summarized in Table 1.

The immediate results in each case have been very fine, and there has been no operative mortality. The postoperative period was uneventful, and clinical recovery was reached within the limits of normal time. Two patients treated by bilateral vagotomy without gastro-entero-anastomosis had gastric retention and dilatation of the stomach, which developed a few days after the operation and persisted for a long time in spite of periodic emptying. It was resolved only after a second, derivative operation. In the remaining cases there was immediate disappearance of pain, continuing throughout the observation period (from three to 12 months). There was rapid improvement in general condition and in weight.

Complete functional and fluoroscopic tests were carried out postoperatively on 26 of the patients. Gastric chemistry, as demonstrated by the researches of Bergonzelli and Givorgre, was almost constantly modified immediately after the operation, with a conspicuous decrease in free hydrochloric acid and total acid. Also, in control experiments made after some time, we noticed persistence of the first postoperative results, with only small fluctuations. In cases in which vagotomy had been combined with gastro-entero-anastomosis, the fall in acid value was still more than in the complete absence of free hydrochloric acid, which could not be revealed even with the histamine test. This factor should be compared with the reflux of alkaline duodenal juice through the neostoma.

TABLE 1

Type of Ulcer	Case No.	Transthoracic Vagotomy	Abdominal Vagotomy	Vagotomy with Gastro-entero-anastomosis
Peptic ulcers	16	0	0	16
Duodenal ulcers	44	1	0	43
Ulcers on neostoma	5	0	1	4
Ulcers that did not heal after gastro-entero-anastomosis	5	0	2	3
	70	1	3	66

Bergonzelli and Givorgre studied the response to various tests (histamine, acetylcholine, pilocarpine, atropine, caffeine), thus confirming theories already known. The insulin test by Honondez, applied to a large number of these patients as an assurance test, showed whether vagus enervation of the stomach was complete and also displayed the absence of the secretory drug response in all cases. Bruni demonstrated through fluoroscopic controls (made at various intervals after the operation, never less than 15 to 26 days) a reduced intensity of gastric peristalsis in most cases Emptying of the stomach has been kept private through the neostoma

In an hour and a half after the intake of a barium salt there were no signs of gastric retention, except in the two aforementioned cases in which bilateral vagotomy alone had been employed Because of the consequent gastro entero anastomosis it was not possible to continue fluoroscopic study of the ulcer healing process

The research studies of Bergonzelli and Givogre demonstrate that vagotomy does not influence digestive leukocytosis which takes place with the same modifications as in normal persons There was a noticeable rise in the red cell sedimentation rate This, however, probably should be ascribed not to vagotomy but to certain immediate and temporary conditions created by all surgical procedures No variations were observed in intrinsic digestive power or in the regulation of blood crisis, which demonstrates the safety of vagotomy on the stomach and on the intestine

Gerbolini, Paletto and Varola have encountered a slight rise in the basal metabolism rate in 80 percent of cases, which merely puts it in relation to a certain sympathetic hypertonicity in the splanchnic territory The dynamic specific action, studied with a 200 Gm test meal after Lichtwitz, was either lowered or absent

The research of other authors shows that the postoperative course of vagotomy varies very little There is a slight increase during the first days due presumably to a more prolonged adrenalin secretion, followed by a depression of neurovegetative tone in the splanchnic region

Gerbolini Paletto and Varola also studied the behavior of liver function after vagotomy They found no significant alterations, the test showed liver function in all cases still within normal physiologic limits They did observe a certain slowing down of liver activity and a catabolic change of the neurovegetative balance, which, evidenced by a sympathetic hypertonicity, demonstrated an increase in galactosuria and a more rapid ascent of the glucose curve

In our clinic, Orecchia and Sommo made accurate researches on the pancreatic function in patients with vagus resections Their results agree with those of numerous other authors It was proved that, in relation to the external resection the diastase and trypsin vary sensibly They observed a new decrease of lipase, which was already below the preoperative level created by the gastric disease This hyposecretion was temporary and soon became normal They found a temporary increase of glycosemia, the maximum value being reached during the third and fifth days and followed by normal values toward the eighteenth day These facts can be explained by the interruption of insulin secretory stimuli of central origin (by vagotomy) and by the appearance of a harmonious regulatory mechanism acting as a substitute for the central action

Gerbolini, Paletto and Varola also studied the electrocardiagrams of vagotomized patients They noted (1) an accentuation of bradycardia already present in 50 percent of patients with peptic ulcer, and (2) a stationary neurodystonic sign of trophism in the second and third derivation This last fact was interpreted as a sign of disturbance of the posterior coronary region of the myocardium whose normal activity was hindered by the abnormal position of the heart As a matter of fact, in some cases the diaphragm is raised because of gastric dilatation following and resulting from vagotomy

Ruffo and Fogliati have studied the behavior of the healing process of linear gastric lesions after vagotomy In opposition to Donati, who observed a delay in epithelization of the wound, they found no modifications of the repairing processes worth mentioning

SUMMARY

Dragstedt's operation at present is the most efficient physiologic surgical treatment of peptic ulcer, because it is founded on the basis of physiopathologic conditions Yet Dragstedt does not wish to substitute bilateral vagotomy for every gastric operation, he proposes only to limit the indications Technically my associates and I prefer the abdominal diaphragmatic route, which, in addition to its minor operative risk, permits exploration of the stomach and execution of another procedure, which is usually gastro-entero-anastomosis but sometimes partial resection, as for postanastomotic ulcer. The results of research confirm the great utility of this surgical procedure. To quote Philip Thorek, "The clinical experiences, which are becoming more numerous, and prolonged observations of the patient so treated, confirm the alluring promise of vagotomy."

RIASSUNTO

Ritiene che l'operazione di Dragstedt rappresenti oggi la cura fisiochirurgica piu' efficace per l'ulcera peptica, in quanto agisce non sopra la manifestazione apparente, cioe' sopra l'ulcera, ma deriva la sua efficacia dallo stesso meccanismo-fisio-patologico che la determina. Preferisce la via addominale, diaframmatica, in quanto oltre diminuire i rischi operatori, consente operazioni complementari, per lo piu' gastro-entero-anastomosi, o piu' raramente, resezioni gastriche parziali (nelle ulceri post-anastomotiche). Il giudizio sopra la vagotomia viene riassunto con le stesse parole di Philip Thorek: "L'esperienza clinica sempre piu' numerosa e la prolungata osservazione degli ammalati confermano le promesse seducenti della vagotomia."

SUMARIO

La operacion de Dragstedt, por el presente, es el tratamiento fisiologico mas eficiente de la ulcera peptica, por cuanto actua sobre las complicaciones de acuerdo con las teorias fisiopatologicas. Tecnicamente, nuestra escuela prefiere la ruta abdomino-diafragmatica por ser la menos peligrosa y, ademas, permite otros procedimientos tal como, la gastro-entero-anastomosis y la reseccion parcial del estomago en casos de ulceras post-anastomoticas. Los estudios de investigacion ya han confirmado el gran valor de este procedimiento, que en las palabras de Philip Thorek, "La observacion clinica de los pacientes operados confirman las promesas alurantes de la vagotomia."

SOMMAIRE

L'opération de Dragstedt, à l'heure actuelle, est le traitement physiologique le plus efficace pour l'ulcère peptique parce qu'il permet d'agir sur les complications de l'ulcère, Il est basé sur un point de vue physiopathologique. Notre école préfère la voie diaphragmatique abdominale. Elle entraine moins de risque, elle permet l'exploration de l'estomac et l'exécution d'autres interventions telle que la gastro- entéro-anastomie et aussi parfois une résection partielle dans les cas d'ulcère postanastomique. Les recherches confirment la grande utilité de ce procédé chirurgical. Philip Thorek dit que "les succès cliniques sont de plus en plus nombreux et que l'observation prolongée des malades ainsi soignés confirme la promesse attrayante de la vagotomie.

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Radium Treatment of Prostatic Hypertrophy

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ONE need never be embarrassed for lack of a method of treatment for hypertrophy of the prostate. At present many technics are available, from which one may choose the procedure most suitable for a particular case. A small or medium-sized adenoma may call for endoscopic resection or a retropubic procedure (Millin), whereas for a prostate considerably enlarged one may prefer a one stage prostatectomy with perineal drainage, strict control of hemorrhage and immediate closure of the bladder. (This is my own technic in such cases.) One may also choose perineal prostatectomy for a very large prostate with marked bulging in the rectum, particularly if the patient is short and stout.

In spite of the great variety of surgical procedures available and the valuable help of anti-shock treatment and antibiotics, which enable the surgeon to perform prostatectomy in one stage, there are frail patients with cardiac disease for whom a rupture of balance is to be feared, particularly if the prostate gland is large.

Patients in this category interest me particularly. In their management I have applied radium therapy with remarkable safety and in many instances with cure. My experience is founded on the following cases.

CASE REPORTS

Patients Treated by Radium Alone

Case 1: A man aged 76 was admitted to the hospital Sept. 10, 1945, complaining of dysuria and frequency of urination. He had a large prostate, abnormally firm to palpation. Urethrographic study resulted in a tentative diagnosis of simple adenoma, but, being doubtful as to the exact nature of the mass, I decided to operate by the perineal approach. A deep biopsy specimen was cut with a surgical knife, and 5 radium-bearing needles (3 mg. each) were implanted in the prostate and left in place for five days. Pathologic examination of the biopsy specimen confirmed the earlier diagnosis of simple adenoma. On removal of the catheter, 15 days after the operation, the patient voided easily, with a residue of only 30 cc. He was discharged in good condition. Control urethrographic studies demonstrated clearly the favorable results obtained.

Case 2: A man aged 69 had been treated since April 1945 for the following complaints: hypertrophy of the prostate; dysuria, grade IV; frequent urination (six times nightly) with a residue of 60 cc. and high androgen elimination. He had been treated intensively but intermittently with distilbene, with alternating periods of improvement and aggravation. He was admitted to the hospital in September 1947, with marked dysuria and the prostate still enlarged. As he was both overweight and hypertensive, it was decided to treat him by implantation of 6 radium-bearing needles, implanted by the perineal route and left in place for six days. Pathologic examination of a specimen taken at operation revealed fibroma. The radium therapy produced a successful result; the patient now sleeps well at night, the frequency having subsided satisfactorily, and the prostate is reduced to normal size.

Patients Treated by Radium with Complementary Endoscopic Resection

Case 3: A man 74 years of age was admitted to the clinic for chronic retention of urine and vesical distention. He had a hypertrophic prostate, very large, and a history of cardiac insufficiency and intestinal disturbance. He had consulted a number of urologists, all of whom refused him surgical treatment, advising medical measures only.

A catheter was inserted and left in place for three weeks, in order to cleanse the bladder. This presented difficulties because of the presence of a small diverticulum. On February 25, 7 radium-bearing needles were implanted by the perineal approach and left in place for six days. Recovery was normal. The patient voided easily but insufficiently; therefore, a simple endoscopic resection was performed on a small obstruction of the vesical neck.

The results, on the whole, were good. The function of the bladder was well controlled, though the urinary residue was still about 60 cc., probably because of the diverticulum. He was improving rapidly in his general condition and was well satisfied. Pathologic examination revealed fibroma, with suspect scattered formations.

Case 4. A man aged 64 was admitted to the hospital March 10, 1948. He was unable to urinate. In addition to sepsis and acute epididymitis (which suppurated a few days later) he had simple hypertrophy of the prostate (size 4). The infection subsided after treatment with penicillin and an indwelling catheter, but the patient remained frail. On March 25, 5 radium bearing needles were implanted in the prostate by the perineal route and left in place for six days. Almost complete lysis of the gland was observed, but, as normal spontaneous micturition was slow to return, simple endoscopic resection was performed on a very limited internal bulge. Recovery was uneventful, and the patient now voids easily.

Case 5. A man aged 67 was admitted to the hospital January 1948, with partial urinary retention, distention of the bladder, loss of weight and a high level of protein nitrogen. The prostate was large and well delimited, a few suspect nodules were present. There were marked cardiac lesions, confirmed by a history of cardiospasm of long standing. In view of these serious conditions and the suspected malignancy of the lesion, it was decided to try radium implantation. On February 7 this was performed, 7 radium bearing needles being introduced by the perineal route and left in place for six days. A biopsy specimen taken at the same time revealed adenoma. Twenty days later the prostate was greatly reduced, but spontaneous micturition remained insufficient. A small endoscopic resection was done on March 1, the specimen revealing adenofibroma. The patient now voids easily and completely.

Patients with Previous Cystostomy Treated by Radium

Case 6. A man aged 75 was admitted to the hospital June 16, 1947, for prostatic hypertrophy (size 4), with retention and distention. The protein nitrogen value was 2 Gm. 20. There was marked anemia (red blood cell count, 2,000,000). A cystostomy was performed, the patient having had an indwelling catheter for a month before admission. By January the protein nitrogen level was reduced to 0 Gm. 50. The patient, however, was frail. Two radium bearing needles (10 mg. each) were implanted through the cystostomy opening and left in place for five days. Three weeks later a catheter was tolerated. At the time of writing, the prostate has almost completely disappeared and the nine months old cystostomy has closed completely, though its closure was gradual. The patient urinates normally.

Case 7. A man aged 73 was admitted to the hospital Dec. 29, 1947, for prostatic adenoma. He had a cystostomy two years old and had been considered unsuitable for any further treatment. The prostate was enlarged (size 3), the patient was adynamic, with bilateral swelling of the lower extremities. After prolonged local treatment on Feb. 1, 1948, through the old cystostomy opening, 2 radium-bearing tubes (10 mg. each) were inserted in the prostatic part of the urethra and left there for five days. On April 3, having carried an indwelling catheter for 20 days, the bladder was closed. Since then the patient voids spontaneously and easily.

Case 8. A man aged 65 was admitted to the hospital Jan. 27, 1948, for total retention of urine. The prostate (size 4) was slightly irregular, and the condition was diagnosed as adenoma suspected of degeneration. A catheter was inserted and left in place to cleanse the bladder. On February 18, with intravenous anesthesia (evipan) a cystostomy was performed and 2 radium bearing tubes (10 mg. each) were inserted and left in place for six days. Implantation was carried out in the prostatic portion of the urethra, a T shaped rubber tube being employed. On March 18, after 10 days with an indwelling catheter, the bladder was closed. Easy and normal function was immediately restored, a small residue (30 cc.) remaining. The prostate was markedly reduced, and the patient was discharged on March 26. The pathologic diagnosis was typical adenoma with signs of fibrolipomatous transformation.

Patients Treated by Both Perineal and Urethral Radium Therapy

Case 9. A man aged 82 was admitted to the clinic July 1947 for total acute retention of urine and vesical distention. The protein nitrogen value was 1 Gm. 80 and was reduced only to 1 Gm. 20 by an indwelling catheter. Cystostomy was performed in September 1947. The patient complained of being "very tired." The heart and kidneys were unstable, the lower extremities were markedly swollen, and the prostate was enlarged and adenomatous. The protein nitrogen value was slowly reduced with high diuretic action (3 liters), and after five months the patient had recuperated somewhat but was still in a precarious condition of imbalance. His condition precluded any serious surgical intervention, but he wished to get rid of his cystostomy. In January 1948, with the patient under general anesthesia, 7 radium bearing needles (3 mg. each) were implanted in the prostate by the perineal route and left in place for six days. As he recovered satisfactorily from this operation, a radium-bearing catheter was placed in the urethra (2 tubes of 10 mg. each) and left in place for 18 hours. The bladder was then allowed to close, and by April the patient was able to void easily

Fig. 1. Roentgenograms taken before administration of radium therapy (left) and after radium therapy (right). Case 9.

and was considered cured. These results were confirmed by urethrographic examination (Fig. 1).

Patients Treated by Cystostomy, Radium and Complementary Endoscopic Resection

Case 10: A man aged 88 was admitted to the hospital Dec. 30, 1947, with total retention of urine, a hypertrophied prostate (size 4), evenly elastic to finger palpation and well delimited, and general symptoms of advanced senility. It was, of course, necessary to minimize surgical risk. On Jan. 27, 1948, a catheter having been in place for some time, a cystostomy was performed and 20 mg. of radium was placed for five days in the prostatic portion of the urethra. The result was complete lysis of the adenoma. The use of a catheter permitted closure of the bladder after three weeks. However, since the patient had not fully regained normal urinary function, a minimal endoscopic resection was performed on March 5. This was followed by easy and complete voiding.

The pathologic diagnosis was adenofibroma. The *patient was discharged, and on March 31 he was* still in very good condition.

Case 11: A man aged 72 was admitted to the clinic in February 1948 for total retention and vesical distention, as well as previous hematuria. The prostate was large, apparently because of simple hypertrophy. The patient's general condition was poor; he was sickly, hypotensive and adynamic. In view of the possibility of an added papilloma of the bladder, it was decided to employ radium therapy and to explore the vesical cavity at the same time through a cystostomy incision, this procedure being indicated by his physical condition. In March a cystostomy was performed. No papilloma was found, and 20 mg. of radium was implanted in the prostatic portion of the urethra and left there five days. The patient was allowed to return to his home and was readmitted in April. His prostate was greatly reduced, and a catheter was placed in the urethra to permit closure of the bladder. A small endoscopic resection completed the treatment, since the patient still urinated with difficulty, and was well tolerated. Vesical function was completely restored, and the patient was finally discharged on May 4.

CONCLUSIONS

With these 11 patients treated by radium therapy, diagnosis of prostatic adenoma was made 10 times, and in one instance the adenoma was suspected of neoplastic degeneration. Radium was administered by various technics.

In five cases (Cases 1 to 5) the perineal *approach was used to implant radium-bearing* needles, and in two patients (Cases 1 and 2) the patients were cured by this procedure alone.

Three patients (Cases 3, 4 and 5) needed a small endoscopic resection. In five cases radium was applied through cystostomy by endo-urethral procedure. In two of these a minimal endoscopic resection was required. In one case radium was applied by both the perineal and the endo-urethral technic.

In none of these patients, who seemed condemned to final cystostomy and could probably not have endured conventional prostatectomy, did radium therapy produce any untoward results. All of them, even those who had been totally unable to void and severely distended, returned to normal function. In a few cases closure of the bladder was delayed on account of the long standing cystostomy. Many had serious cardiac conditions and were markedly unstable. Seven patients were over 70 years old, five over 75, and two over 80. In all cases the radium was well tolerated. No rectal involvement was met with in perineal applications, and urethral application was tolerated as well as a permanent catheter. However, the prostatic urethra showed signs of irritation which in some instances delayed closure of the bladder, a catheter being necessary for some time. I formed a habit of leaving the catheter in place from 15 to 20 days.

Can radium cause urethral damage in the form of sclerosis or stenosis? Apparently not. I found no example of it, and the best point in favor of this opinion is preservation of the potency of the ejaculatory duct, proved by lipiodol injections and roentgen exploration of the spermatic tract.

Technically, the procedures are as follows. Urethral application is meticulously done through the cystostomy opening, two tubes containing 10 mg. each of active radium being generally placed in the vertical portion of a rubber tube, the cross section of which rests transversally on the vesical neck. As for the implantation of radium bearing needles (3 mg. each, the number varying with the given case) the operation is performed with the aid of Young's retractor placed in the urethra, after permeostomy, to force the gland to "bulge" in the operating field and allow easy and accurate implantation. Spaced 1.5 cm. apart, the needles are anchored firmly to a very strong strand (silk and silver wire) which can be easily and safely removed by gentle traction after about six days.

If vesical function was not restored entirely by radium therapy, a complementary resection was done. In every instance this procedure was simple and not at all severe, for only a limited cervical obstruction was present.

How should one make a choice between these two technics? As a rule I use urethral application (through a cystostomy) for patients with severe disturbances of vesical function, retention and distention especially if uremia and infection are present—in brief, whenever cystostomy is advisable. The radium is applied immediately after cystostomy or a few days later.

SUMMARY

Whenever cystostomy is not strictly necessary, I use perineal (permeostomy) implantation. A strong point in favor of radium therapy, in addition to the fragility of some patients, is the suspect nature of adenomas possibly undergoing degeneration. I believe therefore that this original radium treatment for prostatic adenoma will be found extremely valuable for its simplicity and effectiveness. Indeed, it is likely to narrow again the small field of definitive indications for cystostomy.

SUMARIO

Cuando la cistostomia no es estrictamente necesaria, yo uso la implantacion perineal (permeostomy). En favor de la radioterapia, no solo esta la fragilidad del paciente pero aun mas la naturaleza sospechosa de los adenomas que posiblemente puedan y estar sufriendo de degeneracion maligna. Por lo tanto yo creo que este tratamiento original por el radio de los adenomas de la prostata es de gran valor por su simplicidad y poder efectivo. Muy posiblemente, este tratamiento con el tiempo va ha restringir aun mas el campo de indicaciones definitivas de la cistostomia.

SOMMAIRE

Si la cystostomie n'est pas strictement nécessaire, l'auteur emploie l'implantation périnéale. Nous sommes en faveur de la thérapie par le radium chez les malades affaiblis vu la mobilité d'adenome subissant la dégenerescence. Je crois que le traitement au radium pour l'adenome prostatique a une grande valeur, vu sa simplicité et son efficacité. Il est probable que ce traitement diminuera les indications de la cystostomie.

Antagonistic Reflexes of the Middle Meningeal and Ophthalmic Arteries

Influence on Cerebral Circulation and Cerebrospinal Fluid

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IN THIS *brief and practical report I take* for granted the reader's knowledge of all the literature that refers to Rein's reflex, or reflex of the middle meningeal artery, and all the experimental literature that refers to vasomotor innervation of the brain, autoregulation of the arterial pressure of the cerebral vessels, and variations of the circulating blood volume, the mass of nerve substance and the relation of time to cerebral activity and to variations in total arterial pressure.

By "reflex of the middle meningeal artery" is understood a vasodilatation that increases the caliber and the capacity of the internal carotid, also contralaterally, from 80 to 100 percent of the normal capacity. This occurs when, owing to anemia and sudden decrease of pressure in the region of the external carotid, the nervous receptors distributed from 1 cm. above the bifurcation of the common carotid to the trunk of the middle meningeal artery become excited (these do not exist in the terminal branch of the internal maxillary).

On account of this reflex, in cranial operations performed by means of a bone flap which contains at its base the trunk of the meningeal artery, there is often profuse hemorrhage from the meningeal lacunae of the flap of dura mater, as well as oozing hemorrhage from the bone and from the margins of the scalp incision (Serra, 1946). Nasal hemorrhage (Serra, 1946) and hemorrhage within the *medulla spinalis* (Lenz and Winkelbauer, 1940) also occur.

By this vasomotor mechanism, which favors hemorrhage within the cerebral mass and consequently acute edema, I have tried to explain the frequent appearance of cerebral intercellular edema after craniotomy by means of an anterior flap, and I have found it possible to reduce the incidence of Reichardt's edema by preventive anesthetization with cocaine (10 *or 20 percent) of the middle* meningeal trunk to its exposure through a temporary trephine opening at the moment the bone flap is raised. Proceeding very slowly, I explore the arterial branch, anesthetize it and close it, and then cut between the ligatures without causing sudden tension, laceration or anemia. Thus its nervous receptors are not disturbed in the field of the external carotid, which controls the ramification of the middle meningeal.

In anterior operations the branch of the middle meningeal usually is ruptured in the endocranial tract, a few centimeters above the foramen spinosum. The reflex, instead of departing from the receptors of the whole middle meningeal, takes the afferent way of the large petrosal superficial nerve, Wrisberg's intermediary nerve, the fascial trunk and the medulla oblongata to the vagus; from here, efferently in a parallel direction, it reaches the nervous plexus that surrounds the internal carotid (Cobb and Finesinger, 1932; Chorobski and Penfield, 1932).

To these known facts, which I have demonstrated several times in patients, I shall add a reflex that departs from that tract of the ophthalmic artery which passes within the optic canal, producing phenomena directly opposite—namely, permanent decrease of capacity of the cerebral circle, paralysis of secretory activity of the choroid plexuses with diminution of intracranial pressure, a considerable quantitative decrease in cerebrospinal fluid and a shrinkage of the brain caused by interstitial arrest of fluid production.

The clinical phenomena that accompany this syndrome because of the want of fluid are serious: sensory dullness, fever and frequent thready pulse. The Leriche-Mahoudeau syndrome is characterized by sensory disturbances with essential hyperpyrexia but with a normal pulse rate Therefore, in the reflex of the artery Vincent's typical syndrome does not exist In my patient, bronchopneumonia occurred very early I associated this phenomenon with the previous pneumonic edema, which occurred immediately after the operation and probably were concerned in the reflex phenomenon, as they were connected with the vagus The studies of Wolff, Lenox and Allen, confirmed by Wesselkin (1931) show that acidosis of the blood is followed by vasodilatation and alkalosis by vasoconstriction, but before the reactions of the piameningeal vessels to acidosis or alkalosis can be observed a prior reaction of the respiration center is demonstrable This is closely related to the impulses that depart from the vasomotor center

The present report is based on a case of giant tumor of the orbit (a melanosarcoma weighing 440 Gm) By the time operation was performed, the neoplastic mass was, to a great degree, extraorbital I ligated the ophthalmic artery within the optic canal and explored the deep part of the orbit to determine the relations of the tumor mass with the orbital structures and the ethmoidal cells This was done by means of an anterior craniotomy of the Cushing type, and by elevation of the left frontal lobe covered by dura mater

Removal of the dura from the tegmen of the orbit was not at all difficult, and the frontal lobe could be raised quite well, allowing a good view of the orbital tegmen and an easy removal of the upper wall of the optic canal Having raised the nerve and isolated the trunk of the ophthalmic artery, I applied two clips to the arterial trunk Immediately the brain shrank, considerably more than it could have done before, and the dura, being emptied of its contents, began falling into large folds Physiologic solution of sodium chloride (80 cc) was injected beneath the dura During the first 12 hours the patient felt well, but at the end of this period there occurred sensory dullness, high fever, frequent thready pulse and dyspnea The flap was reopened after 20 hours

An impressive shrinkage of the brain was noticed, the dura of the anterior pole, instead of being convex, formed a concavity directed posteriorly and inward There was a nearly absolute lack of cerebrospinal fluid The arachnoidal cavity was filled with physiologic solution of sodium chloride, injected beneath the dura of the frontal pole, and a lumbar puncture was made, 60 cc of the salt solution being injected in order to fill the ventricles The lumbar puncture was repeated twice during the next few hours, as the patient's condition continued to be serious Clinical signs of pulmonary inflammation appeared, but fortunately these disappeared after three days

After 15 days the tumor was easily extracted, with the external carotid ligated previously above the lingual artery Hemorrhage from the soft tissues of the face and from the zygomatic process, to which the tumor adhered, was slight, as was hemorrhage from the depth of the orbit, to which the tumor did not adhere It was necessary to ligate only one arterial branch, which emerged from the external part of the spenoidal fissure.

One who has studied thoroughly the problems afforded by the vasomotor nerves of the brain and the rich experimental literature originating from such studies should not wonder that a vasomotor reflex is caused by the ophthalmic artery, which is the first collateral branch of the internal carotid This reflex is antagonistic to the one that arises from the external carotid

With regard to the ophthalmic artery, its course would no longer take an afferent direction, and the reflex would cause secretory paralysis of the choroidal plexuses and an increase of reabsorption of fluid, due to vasomotor phenomena that are an inverted copy of those which arise from the middle meningeal artery and therefore from the field of the external carotid The problem presented when the sensitive tract of the trigeminal nerve is concerned in the aforementioned phenomenon, as in G Dagnini's oculocardiac reflex, is still unsolved, as is the question concerning participation of the reflexes of the carotid sinus in the cerebral circulation (E Ask-Upmark, 1935), with regard to the vascular phenomenon just described

Regulation of the cerebral circle, even under normal circumstances, is extremely complicated

Therefore, leaving aside the problem of pathogenesis, it should be emphasized that two circulatory reflexes are produced in particular circumstances by the two carotid arteries on the brain. Each of these reflexes is antagonistic to the other, because of immediate circulatory, and later cellular, phenomena.

Knowledge of these simple data impose upon the surgeon certain technical rules, already partially known, that must be observed in order to operate skillfully on the brain.

SUMMARY

A two stage operation for giant orbital tumor is described. Through a frontal flap the ophthalmic artery was secured with three clips in the optical canal. In the following days there was a marked shrinking of the brain, which undoubtedly was induced by a vasomotor reflex impulse starting from the external layers of the artery. Such a reflex is antagonistic to the one known as the reflex of the meningeal media (Rein). Later the tumor was easily removed, with successful recovery of the patient. To our knowledge, this procedure of tightening up the ophthalmic artery has not been previously reported.

RISSUNTO

L'A. presenta un caso di tumore gigante (gr. 440) dell'orbita felicemente operato con la allacciatura preventiva dell'arteria oftalmica entro al canale ottico, e poi con la allacciatura della carotide esterna al di sopra della linguale. Dopo la allacciatura dell'arteria oftalmica arteria è stato osservato per 3 giorni un forte raggrinzamento del cervello per diminuzione del circolo e per cessazione della produzione del liquor c.r. che è stato complicato da edema polmonare e da broncopolmonite. L'A. attribuisce questi fenomeni ad un riflesso partito dai nervi vasomotori dell'arteria oftalmica, riflesso che è antagonista di quello già noto della meningea media (H. Rein).

SOMMAIRE

Il s'agit d'un cas de tumeur de l'orbite, dans le quel fut exsecutée la ligature prealable de l'artére opthlmique. Dans les jours suivants on a observée une sindrome tres grave d'aliquorrhée que l'A. explique avec un réflex nerveux à depart de l'innervation sympathique de l'A. o., reflex qui est l'antagoniste du reflex bien connu de l'artère meningée mojenne (H. Rein).

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Rare Tumors: Etiology and Localization

Report of Three Cases

FAHRI AREL, M.D.
ISTANBUL, TURKEY

TWO cases of tumors in rare locations are presented. A third case is added, which is of interest for etiologic reasons.

Case 1. Submucous Lipoma of Duodenal Bulb. A woman 50 years old was operated on 27 years ago for gastric pains diagnosed as due to gastric ulcer. Gastro-enterostomy was performed. After the operation the intensity of the pains lessened, but the pains continued. The patient was admitted to my clinic.

Palpation during clinical examination revealed an elastic tumor the size of a walnut, somewhat to the right of the umbilicus. The digestive tract showed no abnormality.

Roentgen Examination: A barium meal was administered. The contrast substance passed easily through the stomach to the jejunum, though some remained in the prepyloric portion, owing to adhesions. Passage of the pylorus was seen clearly. A clear, round shadow at the duodenal bulb suggested a large papilloma. Some adhesions were present around the stomach, but no jejunal ulcer was observed. Roentgen examination of the gastro-intestinal tract revealed no abnormality.

Operation: After the adhesions between the stomach and the liver had been disposed of, examination of the anastomosis showed that neither a gastric nor a jejunal ulcer was present, but near the pylorus, at the duodenal bulb, submucous lipoma the size of a pigeon's egg was observed and extirpated.

Comment: Although lipoma of the intestinal tract is not very infrequent, lipoma of the duodenum is rare. Since 1933 I have operated on about 2000 patients with gastric and duodenal diseases without once encountering a duodenal lipoma. The symptoms of this type of tumor vary according to the site of the tumor in the intestine. Lipomas at the pylorus near the duodenum cause symptoms of pyloric stenosis. Some cases have been reported in which the only clinical symptoms were abdominal pains.

Case 2: Fibrosarcoma Localized at Head of Pancreas. A man 48 years old had suffered from abdominal pains for five years. He had lost weight conspicuously. For three months he had noticed the presence of a movable tumor in his abdomen.

Examination: On clinical examination of the abdomen, a hard tumor the size of an orange was palpable. It occupied the right hypochondrium and was movable toward the umbilicus. The right kidney was palpated separately, the tumor being fixed with one hand. The absence of clinical symptoms in relation to the digestive tract suggested the possibility of a tumor of the omentum or the mesentery.

Operation: An operation was performed June 9, 1947. A retroperitoneal tumor at the head of pancreas was observed, surrounded by the second portion of the duodenum. This circumscribed part of the duodenum was pushed and distended by the tumor which was attached firmly to the duodenum and to the head of the pancreas. In spite of its adhesions, the tumor could be separated from the head of the pancreas by passing through normal pancreatic tissue, but its adhesions to the duodenum were so firm that in the process of extirpating the tumor, some parts of the intestine were torn.

That part of the intestine which adhered to the tumor was resected and removed. Bile flowed from the upper part of the duodenum indicating that the ampulla of Vater had not been harmed. The lower part of the duodenum was closed and duodenojejunostomy was performed. The postoperative period was normal.

Microscopic Examination: Microscopic study resulted in a diagnosis of fibrosarcoma.

Result: The patient was sent to the Institute of Radiology. He gained 16 Kg. in two months. He has reported recently that he is healthy and working.

Comment: Aside from tumors of the lymphatic glands of this region, malign tumors occurring retroperitoneally at the head of the pancreas are very rare. Although in this case the tumor was large and reached the second part of the duodenum, it caused no injury to the bile ducts or the intestine. This is not unique. Cases have been reported in which malignant tumors of the head or the body of the pancreas grew toward the third part of duodenum without compressing the ampulla of Vater.

A notable peculiarity of this case is the fact that although attached to the duodenum and the head of the pancreas, the tumor was mobile. I have reviewed the literature without discovering a similar case.

Case 3: Sarcoma at Site of Quinine Injection. A 30-year-old man had had attacks of malaria nine months previously and had received 12 injections of quinine in the buttocks. After the 12th injection he felt in the right gluteal region a solid, painless, mobile mass. The physician in charge told him that this was possibly related to the quinine injection, but was nothing to worry about.

This tumor grew rapidly but remained painless. The patient who thought it was an abscess, applied some cataplasm over it and the skin, which has been normal, became ulcerated; brownish pus flowed from the mass. Instead of shrinking, the tumor continued to grow. The patient was admitted to this clinic.

A cauliflower tumor 10 cm. in diameter was observed on the right buttock. Its surface was seen ulcerated. It was painless and could be moved over the underlying tissues. No inquinal metastases were present. The tumor was extirpated radically.

Microscopic Appearance: The diagnosis after microscopic study was fibrosarcoma.

Treatment: Postoperative roentgen therapy was administered. Two years later the patient came to us with an enormous metastatic growth in the right iliac fossa. Biopsy revealed sarcoma with fusiform cells.

Comment: This case emphasizes once more the difficult etiologic problem of cancer. Did the quinine produce the sarcoma? To make such an assumption would be unwise. To date no case of cancer from such a cause has been described in the etiology of cancer, but researches are producing new theories every day.

W. Boyd, in his textbook on pathology, states: "It must not be supposed that the only potent carcinogenic agents are the hydrocarbons. Clinical observation has long shown that arsenic has carcinogenic power when taken as a medicine for too long a period. So simple a substance as zinc chloride can induce the growth of so complicated a tumor as a teratoma when injected into the testicle of a rooster. Perhaps the future will reveal other chemical substances with similar potentialities."

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Contribution to Bone Surgery

BURHANEDDIN TOKER, M.D.
ISTANBUL, TURKEY

IN the following pages a few cases of bone tumor are presented on which I operated by osteoplastic methods. They are, I think, of some interest from the clinical point of view as well as from that of morbid anatomy.

CASE HISTORIES

Case 1. A 45 year old peasant was admitted to our hospital on [illegible] 13, 1942, suffering from a spontaneous fr[illegible] the right thigh. His anamnesis reve[illegible] he had fallen lightly while working in [illegible]. He first went to a quack bone setter [illegible] successful treatment only aggravated [illegible] that he eventually decided to apply to [illegible]. He suffered from a fracture of the [illegible] caused by a new growth. The x-ray [illegible] a "localized fibrocystic osteodystro[illegible]. A piece [illegible] obtained by biopsy was examined by the pathologist, who qualified it as "Knochen-marksfibrose," i.e. fibrosis of bone marrow. When we tried to obtain a second sample by biopsy the patient refused and left the hospital.

Two years later he returned in a very poor general state. He had become very anemic and emaciated. The right thigh had grown enormously, from the knee up to the crista iliaca. The skin appeared bluishly discolored and subcutaneous veins were clearly marked. Figure 1 shows the huge swelling better than any description. X-ray (Fig. 2) gave evidence of an advanced disintegration considered as an osteolytic bone sarcoma. The clinical syndrome agreed with this diagnosis.

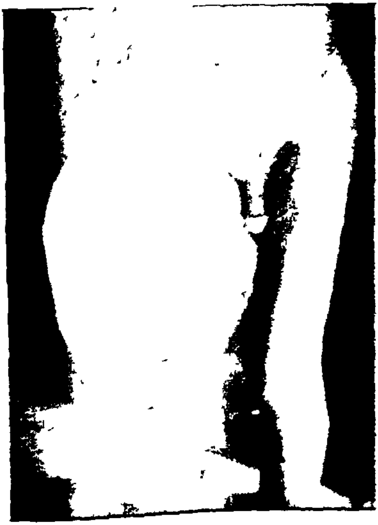

Fig. 1

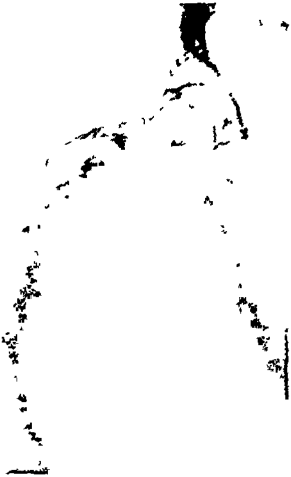

Fig. 2

[illegible]

out of the question. As seen in Figure 3, by intervention the right pelvic bones had also been partly removed and the leg disarticulated (exarticulatic interileoabdominalis). This very extensive intervention was performed in our hospital for the first time and we had success as the wound healed nearly *per primam intentionem.*

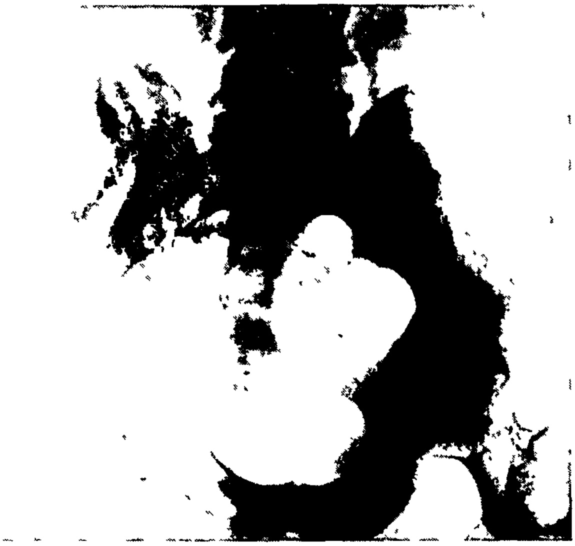

Fig. 3.

The whole extirpate was examined by Prof. Schwartz and by histological analysis. He diagnosed it as a chondrome, i.e. a benign kind of tumor. We kept the patient for two more months in the hospital and found him recovering rapidly. Two and a half years later the patient returned for inspection. He had gained considerably in weight and looked well. His general state was quite satisfactory. No local recurrence was found nor metastatic relapse elsewhere. He only complained of postoperative hernia due to the lack of the anterior part of the pelvic bone. He was submitted to orthopedic treatment.

The interesting point in this case is the fact that a growth which clinical evidence showed to be malign proved by histological examination to be of a benign nature. Thus surgical treatment was fully successful.

Case 2: Osteochondroma of phalangeal bones may grow considerably as is demonstrated in our second case: The 20-year-old male patient noticed nine years before admission some solid, sharply delimited nodes of hazelnut size on his left hand, which at first caused no trouble. But in the course of the last years, the growth increased to such an extent that the patient had difficulty in carrying their weight. During the last time the trouble was complicated by some evil smelling ulcerations in the region of the tumors. Examination showed a tumor the size of a child's head at the left forefinger, and two other tumors of similar size at the little finger (Fig. 4).

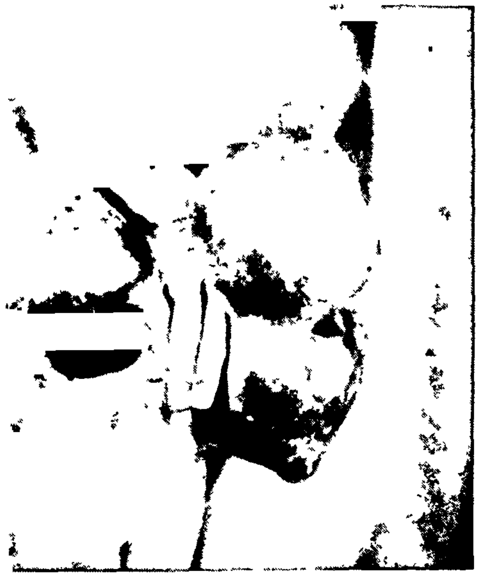

Fig. 4.

Surgical treatment appeared somewhat difficult

Fig. 5.

at first but finally it was carried out without amputation of the hand The growths were removed by sacrificing the little finger only. The wound healed quickly and the patient left the hospital shortly afterward (Fig 5)

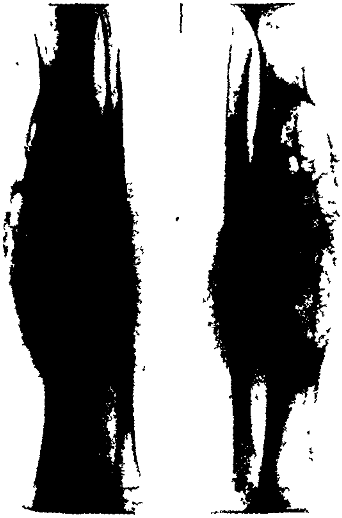

Fig 6

Case 3 An 18-year old male patient suffered from growth of the *entire right tibia*, affected in an extension of about two cm (Fig 6) The tumorous bone was removed in the usual way and was replaced by the adjacent fibula in two osteoplastic stages Already a year after operation the implanted bone started growing thicker and stronger (Fig 7) Four years later x-ray control showed the fibula adjusted properly at both ends of the implantation and grown to the thickness of the former tibia (Fig 8)

Case 4: Another fibula transplantation was performed on a 13-year old boy according to the method of Hahnbrandes The boy was admitted in 1946 to our hospital because of a swelling on his right lower leg He told us that he was hit three years ago at this spot by a stone The tumor, which, for a long while did not exceed the size of an egg, lately started to grow fast and nearly reached the

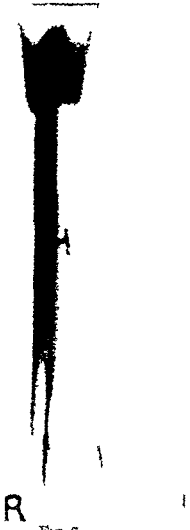

Fig 7

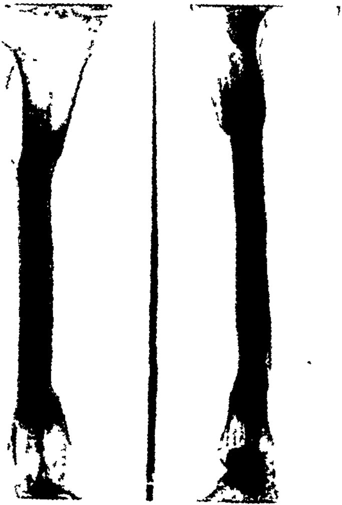

Fig. 8

size of a child's head. X-ray showed the tibia structure being dissolved from the upper epiphyseal line down to the middle of the diaphysis by fibrous and cystic growth (Fig. 9).

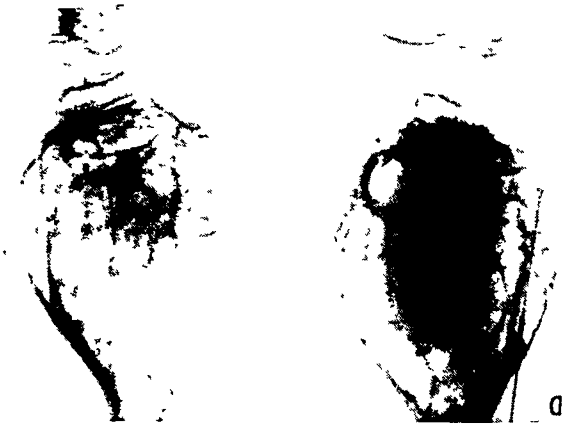

Fig. 9

By intervention in two stages, the tumor was removed and the fibula implanted in its place (Fig. 10). Since then I have successfully performed two other operations by the same technic.

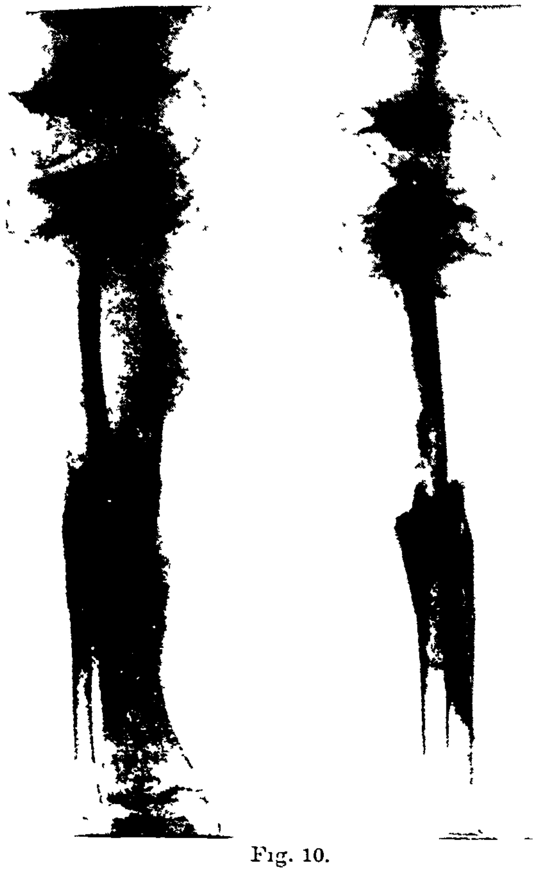

Fig. 10.

I wish to emphasize that in both cases grafts gave no evidence of regressive atrophy. In another transplantation of free (heterogenous) fibula graft, however, which I made, the bone showed at first extensive regressive alterations and only much later started to thicken by secondary regeneration.

Case 5: Figure 11 shows an x-ray taken in 1941 of the femur of a 20-year-old male. The patient applied to us because of painful growth in the left thigh.

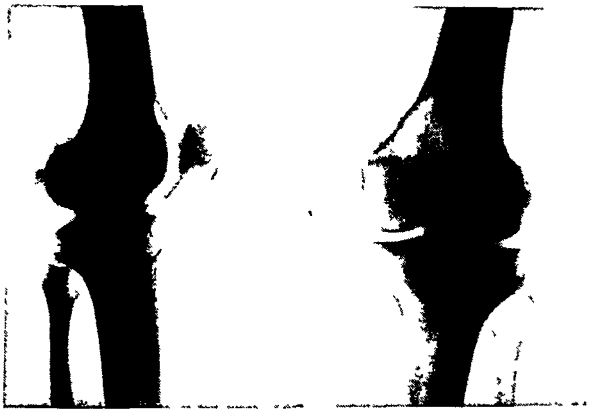

Fig. 11.

Clinical and radiological examination led to the impression of a benign osseous tumor at the lower end of the left femur, causing diffuse clearing of bone structure. I therefore planned curettement of the affected region and refilling of the defect by bone particles. However, during operation we found the whole lower end of the femur in tumorous infiltration down about eight cm. above the condyli. As the corticalis femori too appeared to be affected conservative treatment seemed contraindicated. I therefore removed the whole lower third of femur by resection and restored the continuity of the femur down to the knee by Juwara's reversed bone plastic method (Fig. 12). The operation gave rise to no complications. Histological analysis of the extirpated piece showed a sarcoma with quite a lot of giant cells. This kind of sarcoma sometimes proves to be only locally malignant but rarely causes metastatic growings in other regions.

SUMMARY

As far as I know, only 12 cases of this kind have been published since Juwara's first publication in 1921, two of these being described by Professor Nissen, my predecessor in Istanbul. It is obvious that sarcoma cases, which

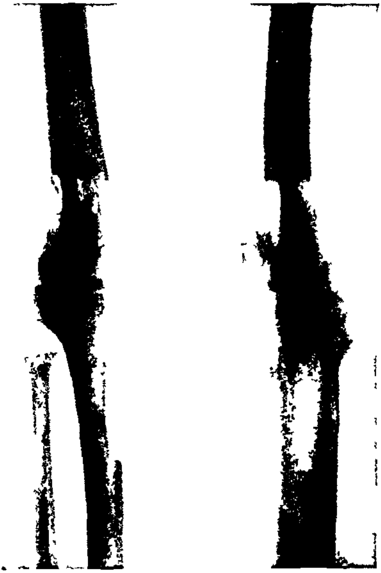

Fig 12

show very quick growth and metastatic complications should not be treated by osteoplastic intervention

The case, referred to above, has been inspected since, several times The leg works well But bending and extension of the knee joint has remained somewhat reduced so far, because the patient, a very sensitive subject, is not inclined to increase agility by active exercise

RIASSUNTO

Casi simili a quello illustrato dall'A si limitano a 12, dalla data della prima pubblicazione di Juwara nel 1921 Due casi consimili sono stati descritti da Nissen, predecessore di Toker ad Istanbul E' intuitivo che sarcomi a sviluppo molto rapido e con riproduzioni metastatiche non si prestano ad operazioni osteoplastiche

Nel caso illustrato dall'A l'operazione ha raggiunto un esito relativamente soddisfacente La gamba lavora bene Esiste solo una lieve limitazione nei movimenti di flessione e di estensione del ginocchio, che l'ammalato, molto apprensivo, non ha sottoposto abbastanza ad allenamenti fisici.

SUMARIO

Es mi conocimiento, que solo 12 casos de esta clase han sido publicados desde el primer reporte de Juwara en 1921 2 de los casos fueron reportados por mi predecesor en Istambul, el profesor Wissen Es indudable que los casos de sarcoma de rapido crecimiento y con complicaciones metastaticas, no *se deben de ser tratados por la intervencion* osteoplastica

El caso en este articulo ha sido examinado varias veces La pierna trabaja bien, con excepcion de la flexion y extension maxima de la rodilla, esta limitacion se debe en parte porque el paciente, siendo algo sensitivo, no se inclina a practicar ejercicios activos

SOMMAIRE

L'auteur croit qu'il n'y a eu que douze cas publiés depuis la publication du rapport de Juwara en 1921 Deux de ces cas avait été décrits par le professeur Nissen mon predecesseur a Istanbul Il est évident que les cas de sarcome, qui montrent une croissance rapide et des complications metastatiques ne doivent pas subir une intervention osteo plastique

Le cas ci dessus rapporté a été revu plusieurs fois Le membre fonctionne bien Il y a quelque diminution de *flexion et d'extension* du genou Le malade est très sensible et n'est pas disposé a augmenter son agilité par des exercices actifs

Transplantation of Renal Calyces in Man: Technic and Results

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OPERATIVE experience with the renal calyces is limited. In fact, until recently the calyces have had no surgical history. This is due to various factors:

1. Surgical treatment of the calyces is rarely indicated. This, however, has no great significance, as indications for surgery in general are constantly increasing.
2. There has been a dearth of experimental research, probably due to technical difficulties. This may be ascribed not only to the delicacy of the organs but to the nonexistence of actual calyces in the more common laboratory animals. The renal pelvis in such animals is formed by a single cavity.
3. There is a prevailing skepticism about all the surgical possibilities except certain procedures that may be destructive to organs so weak and so difficult to approach.

With regard to the anatomy and nomenclature of the calyces, a certain disagreement exists. According to some anatomists there are three major calyces: the superior, the medial and the inferior, the first and the third taking an oblique direction from the superior and inferior pole to the renal pelvis, and the medial a horizontal direction. This calyx opens, according to Testut, sometimes into the medial part of the renal pelvis and sometimes into one of the other two major calyces, usually the inferior one.

According to Papin there are only two major calyces, forming a sharp angle or one continuing the other. Each of them contains smaller calyces, among which one is sometimes large enough to simulate a third major calyx. This may open into the inferior or the superior calyx or (exceptionally) into the angle of their junction. This junction sometimes receives other minor calyces as well.

Deviations from the norm are frequent because, instead of two or three, several calyces may open directly into the renal pelvis.

The minor calyces number from seven to 13, with an average of nine. I have purposely called them major and minor calyces and not calyces of the first, second and third order, that I may avoid increasing a confusion that is already considerable. Testut calls the minor calyces of first order and the major calyces of third order, while to Papin the major or primitive calyces are the calyces of first order and are followed by calyces of the second and the third order, which are those situated nearest the periphery. I suggest that, in order to avoid confusion, the calyces should be referred to as major, medial and minor calyces.

According to Testut, the length of the major calyces varies from 3 to 26 mm., with an average of 12 to 18 mm.; other anatomists estimate the length at 20 to 25 mm. The length of the calyces decreases in the order of their importance—superior, inferior and medial—and their form is that of a cone-shaped trunk whose diameter decreases from the periphery toward the pelvis. Opposite the length of the calyces is the extension of the renal pelvis that causes the calyces to vary in shape from ampullate to ramiform. Generally, however, it is impossible to determine the disposition of a calyx by its external conformation except in those rare cases when it is situated entirely outside the sinus.

The anatomic constitution of the calyces is the same as that of the pelvis. They are composed of three layers: connective tissue, muscle (two layers) and mucosa.

The first operation performed upon the calyces was calycectomy, which is a limited nephrotomy generally performed to remove a stone or to effect drainage.

The removal of a calyx is closely connected with renal resection; some authors call renal resection also resection of the calyx. Papin distinguishes between resection of the parenchyma without opening the calyces and resection with opening of the calyces. Lilla considers *painful calycectasis an indication* for resection. Redi has also described this type of dilatation of the renal calyx, proposing resection of the renal pole. Lasio performed three renal resections for calculous suppuration of the calyx.

Resection of the upper pole of the kidney for hydronephrosis of a calyx was reported by Mingazzini, Steiner, Peterson and Ikeda described three cases of cyst of the upper pole of the kidney, which they ascribed to diverticulum of the calyx; they excised the cyst and eliminated communication with the calyx. According to these authors the first case of this kind was described by Prather.

As for treatment of the calyces that remain open after resection, some surgeons prefer to leave them open, introducing a drain, while others close them by suture or ligature, at the same time suturing the parenchyma. Still others close only the overlying parenchyma, generally with capsular superficial stitches, leaving the calyces open. Suture of the two parenchymal flaps may be performed either directly or with another tissue interposed for the purpose of hemostasis.

I have no knowledge of other types of operation on the calyces. In the case to be reported I retransplanted calyces into the renal pelvis.

CASE REPORT

A woman aged 37, married and the mother of four children, was admitted to the hospital complaining of pains in the lumbar and right iliac region of three years' duration. The pains appeared at intervals of 15 to 20 days, lasting only a short time. They disappeared when the woman was put to bed in the right lateral position and treated by application of heat. The pains had increased during the two months before admission. Otherwise the history was noncontributory.

The patient's general condition was very poor and she appeared to be in pain. No abnormality was noted except a hard mass in the right hypochondriac region. This caused little pain and could be displaced by manual maneuvers. It gave the impression of an enlarged ptotic kidney.

Examination of the urine gave negative results (azotemia 0.50 percent). The results of cystoscopic examination were negative also. Chromoscopic study revealed elimination of color after five and one half minutes. On the left no elimination was observed. Ureteral catheterization revealed no abnormality. The residual urine on the left was well colored; on the right it was pale and watery, emerging with a quick continuous rhythm. The urinary sedimentation rate was normal. (Urea values: left, 24 percent, right 13 percent.)

The clinical diagnosis was hydronephrosis of a ptotic right kidney. Roentgen examination confirmed this diagnosis; the roentgenogram showed no stones. Descending urographic study revealed quick bilateral elimination. At the right there was enormous hydronephrosis, with rotation (probably anterior) of the renal axis; the inferior pole of the kidney rose above the crest of the ilium. On the left the picture was normal.

TECHNIC

On April 4, 1947 a right oblique lumbotomy was performed with the patient under ether anesthesia. The ptotic kidney was turned around the peduncle. When the kidney was raised it showed itself enlarged; its inferior part was strangulated by a vascular loop, congested and adherent to the neighboring tissues. This inferior part showed an independent peduncle, formed by an artery arising from the aorta about 7 cm. below the normal renal artery and from a vein (a branch of the utero-ovarian vein) which opened anomalously, into the renal vein (as it does normally at the left), rather than into the inferior vena cava; the course of this vein was in the neighborhood of the kidney. The pelvis was enormously enlarged, with thickened walls; it had the appearance of an empty sac and in spite of the vascular peduncles was single and had a single ureter without an infundibulum. The artery of the inferior peduncle caused an angulation between the kidney and the pelvis, owing to its course and the ptosis and rotation of the kidney.

After previous ligation of the vessel that strangulated the parenchyma, the lower part of the kidney and a part of the pelvis were resected. In order to reduce the volume of the pelvis without detaching the ureter, another portion of the pelvis was removed from the part attached to the renal parenchyma; this maneuver sectioned the collum of a calyx and circumcised another one. This calyx was grafted into the remainder of the pelvis, its permeability being secured by passing a stitch through the anterior and posterior walls of the pelvis. A superficial suture including two layers was performed in such a way as to form an infundibulum. The sectioned surface of the kidney was closed, with interposition of muscular tissue taken from within the lumbotomy wound. Quick nephropexy was performed by means of two stitches passed below the 11th and 12th ribs and including the renal capsule. Tubular drainage was instituted in the region of the pelvis. The wound was closed.

The patient bore the operation excellently, and the postoperative course was completely apyretic. During the first three days the urine was hematic, but it soon cleared. On the fourth day urine began dropping from the drainage tube, reaching its maximum on the sixth day and disappearing on the 14th. The drainage apparatus was then removed, the remainder of the wound having already healed completely. The patient was kept in bed until the third week in order to strengthen the operative area; after a few more days she was dismissed, feeling absolutely well. Her general condition was much improved, and she had gained in weight.

Control tests before her discharge from the hospital showed limpid urine without pathologic elements (azotemia 0.35 percent). Chromocystoscopic examination showed elimination of color after four and one-half minutes on the left, while on the right the meatus was contracted and color was scarcely visible. Catheterization of the ureters resulted normally on the left; on the right the urine was pale but less so than before the operation; a few cubic centimeters were continuously discharged with a somewhat intermittent rhythm. (Urea values: left, 18 percent; right, 9 percent.) A descending pyelographic study showed prompt bilateral elimination and dilatation of the calyces, which were filled uniformly. The pelvis filled slowly. Ascending pyelographic examination showed the pelvis irregularly funnel-shaped. The inferior calyces had been resected, but the medial transplanted calyces were evident. The flow of urine toward the bladder was normal.

COMMENT

It may be that an analogous result would have been obtained by employing one of the many methods of renal pelvis resection already known (e.g. Forssmann's), though not with pyeloplication, because the pelvis was already open on account of the removal of the inferior pole of the kidney. But it would have been impossible to construct an infundibulum to receive the discharge, and furthermore it would have been necessary to transplant the ureter into the weakest part.

Having the choice between transplantation of a calyx and transplantation of the ureter, I preferred the former for the following reasons:

1. Less urine runs through the collar of the calyx than through the ureter. There is accordingly less pressure against the suture, and a possible eventual stenosis would cause less important damage; also, the conduit within the ureter is narrow, opening into a larger one. The peristaltic waves lead the liquid as far as the pelvis, where the only power of inertia breaks them.
2. The durability of the suture is better protected by the kidney than by any other structure.

Given the conditions that make it feasible, which I shall mention later, the transplantation is not very difficult, technically speaking. In order to prepare it, it is necessary to cut the collar as long as possible and then to isolate it partially, separating it from the renal parenchyma; this is done easily by delicate manipulation. In order to reimplant it into the suture of the pelvis, it is convenient to place two supporting stitches in each of the two pelvic walls with the purpose of securing permeability. The surfaces of the calyx are sewed to the opening of the pelvis, which is later closed by means of a superficial suture. A second, introflexing suture covers the preceding one, as well as the two supporting stitches just mentioned.

On the whole, the technic of the graft differs little from that of neo-ureterocystostomy or that of ureterosigmoidostomy, provided one takes account of the smaller dimensions of the viscera involved.

A chromocystoscopic control examination could be performed only at the time of the patient's discharge, 20 days after the operation, because the patient, feeling well, refused to submit to further investigation. The function of the right kidney was restored.

Roentgenologically the patient was followed up for a year. A descending pyelogram taken 20 days after the operation showed the reimplanted calyces uniformly filling at the same rate as those of the other side. They were still a little dilated; injection of the pelvis was slow (atony of the calyces). After 27 days an ascended pyelogram showed a normal appearance of the pelvis and of the calyces.

After two months an intravenous urogram revealed prompt elimination of the contrast medium At the same time the right renal pelvis was filling rapidly and simultaneously with that of the left side, though its evacuation was slower (the atony of the calyces had disappeared, but hypotonia of the pelvis persisted) The transplanted calyces were a little less fully injected than the upper ones, but their dimensions were normal

After seven months the two kidneys were eliminating simultaneously and symmetrically Descending pyelographic study showed clearly the two upper calyces, which opened into the upper part of the pelvis (that which is continued below by the ureter), while the two medial, reimplanted calyces, each proceeding independently, opened in the neighborhood of insertion of the ureter

At the end of about a year elimination persisted, continuing to be quick and regular (descending pyelogram), and the morphologic picture confirmed the results of the previous examination, showing normal surroundings and volume of the calyces (ascending pyelogram)

Only after some years will it be possible to speak of definitive results, but so far as I can ascertain at present the operation was successful and proves the possibility of transplanting the renal calyces

It is, of course, more difficult to establish definitely the conditions that permit operation, because it is certain that not all calyces can be reimplanted into any type of renal pelvis, the experience of a single case is not sufficient However, the essential conditions are a certain length of the major calyces and eventually of the intermediate ones, and a renal pelvis with an extrarenal development not less than normal Pyelectasis may make the maneuvers easier, intrarenal nephrosis may hinder them The normal thickness of the walls of the calyces and of the pelvis is sufficient for suture

Hydronephrosis which causes an increase *in the thickness of the walls, will make the* work easier while any pathologic condition that decreases their thickness is a contraindication

SUMMARY

A case is reported of voluminous right hydronephrosis with ptosis and rotation of the kidney around a vascular, anomalous peduncle directed to the inferior pole of the kidney, with the initial part of the ureter bending away from the pelvis Another vessel was constricting and strangulating the inferior pole of the kidney, which showed degenerative signs The renal pelvis had the appearance of a large flabby sac

It was necessary to resect the anomalous peduncle and subsequently the inferior pole of the kidney, because the latter would otherwise have been left without vascularization and because a large portion of the pelvis was already altered In order to achieve this it was necessary to transplant two calyces (one completely, the other partially) from their natural opening into the renal pelvis, retransplanting them later into the pelvis The volume of the pelvis was not reduced, and its function of ureteral discharge was restored

The two transplanted calyces came from the median part of the kidney, thus it was possible to preserve the function of this portion of the parenchyma

It would be premature at present to define the indications for this procedure Conditions vary from case to case both anatomically and pathologically I believe that transplantation could be performed (a) in cases like that just described, (b) when it is necessary to resect part of the pelvis because of neoplastic disease or traumatic lesions, and (c) in renal operations in which the possibility of isolating a calyx may enable the surgeon to limit resection

The most important point is the fact that it is possible to transplant a calyx into the renal pelvis and, eventually, directly into the ureter and to obtain an excellent functional result

RIASSUNTO

Ritiene prematuro definire le indicazioni per il trapianto degli ureteri, dato che le condizioni anatomiche e patologiche variano de caso a caso Ammette comunque che l'operazione possa essere eseguita in contingenze simili a quelle segnalate da Mingazzini, e quando possibile, ricorrenso all' asportazione parziale della pelvi renale nella affezioni neoplastiche e nelle lesioni traumatiche E' importante ricordare che è possibile tra

piantare un calice nella pelvi renale e—caso mai—direttamente nell'uretere, con un eccellente risultato funzionale.

SUMARIO

Es al presente prematuro el delinear las indicaciones de este procedimiento, por cuanto ellas varian de caso en caso, tanto bajo el punto anatomico, como en el patologico. En mi opinion, esta forma de transplantación esta indicada en casos come el que se ha descrito en este artículo, y en los casos que requierén la resección parcial de la pervis del riñón, (cancer y lesiones tráumaticas).

El punto de mas importancia, es el conocimiento de parte del cirujano de que es posible el transplantar un calix en la pervis del rinon y eventualmente su transplantacion directa en el ureter, obteniendo asi, resultados funcionales excelentes.

SOMMAIRE

Il est encore trop tôt pour préciser les indications de ce procédé. Les conditions varient anatomiquement et pathologiquement dans les differents cas. Je crois que la transplantation peut être faite dans les cas précédemment décrits et quand il est nécessaire de faire la résection d'une portion du pelvis, résection indiquée par des lésions néoplastiques et traumatiques, et aussi dans les opérations renales quand il y a possibilité d'isolement d'un calice afin de limiter la résection.

Il importe de savoir qu'il est possible de transplanter un calice dans le bassinet du rein et, après quelques temp sans l'uretère. On peut d'obtenir ainsi un excellent résultat fonctionnel.

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Surrounding and Suspending Ligature of the Kidney

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THE suggestion I am about to make is founded on a case of nephrotomy in which there were extraordinary adhesions of the kidney to a thick and tenacious mass originating from a lingering perinephritic suppuration following a renal operation The kidney, after having been isolated, appeared much altered There were many lacerations of the parenchyma involving not only the cortex but often the deep layers

Under these circumstances I had no success in trying to arrest the copious hemorrhage Before deciding to perform nephrectomy, I performed a sort of sausage like ligation which, on the whole, resulted satisfactorily and permitted conservation of the organ Some technical difficulties, however accompanied this procedure

There are few surgeons who have not seen a renal infarct occurring as a consequence of nephrotomy The pathogenesis of such phenomena is uncertain But there is no doubt about the predisposing influence of the nephrotomy incision The presence of a foreign body within the renal parenchyma, with all its mechanical consequences is bound to favor the appearance of such phenomena However there is no doubt that the passage of catgut sutures through the renal parenchyma may predispose to other injurious phenomena as well to the cost of both vessels and tissues The catgut disappears sooner or later, but serious injuries may be caused mechanically by the suture needle and the catgut itself and reabsorption does not occur as quickly as is commonly believed Often there are local consequences due to mechanical factors, and there are also general reactive phenomena due to biologic incompatibility with the animal nature of the thread One must conclude, therefore that in many cases the process of suturing may very well be a causative factor in hemorrhage, thrombosis, infarcts, and sclerosis

The Surgical and Pathological Institute of the University of Messina proved experimentally that the permanence of a catgut thread within the renal parenchyma is always responsible for remarkable modifications in the tissues

Other difficulties also have been noted with renal sutures for instance Papin reports that in several instances a stitch has loosened or has become untied causing more or less serious hemorrhage On the other hand if a stitch is too tight it may cause compression necrosis which in turn may lead to serious secondary hemorrhage

In order to avoid these complications different technical expedients and many methods of suture have been proposed It is absolutely impossible to assure success, however, and some surgeons do not sew at all but rely on tamponade Unfortunately this method also has its inconveniences

Another consideration is that under certain metabolic conditions a foreign body situated within any segment of the urinary system, may act as a nucleus for the formation of stone. There is no doubt that a thread of catgut within a sutured kidney, in spite of its absorbable nature, may remain too long in contact with functional elements of the organ, it is impossible to be certain that nucleus formation will not occur (this fact is well known) At all events it is advisable to avoid leaving foreign material (even very fine catgut) within the renal parenchyma

Another point against suturing is the fact that if by chance a calyx is perforated under certain conditions, the formation of a fistula may be the consequence

All the basic principles of surgery are founded on the idea of achieving certain results with as little trauma to the renal vessels as possible Particular care is required for incisions as well as suture, for injury to these vessels is serious and has serious consequences It is important to know that, for many reasons, serious lesions may be produced in important vessels at the very moment of suture, even though the incisions are performed in the proper anatomic area and with the proper technic; even though the suture is carried out with equal circumspection; and even though the needles are of the correct form and inserted in the correct manner. Yet renal lesions are sometimes—fortunately seldom—irremediable by conservative means. It is sound surgical therapy to consider nephrectomy of a nephrotomized kidney when all other therapeutic measures have failed to stop the hemorrhage.

Therefore, if it were possible to restore the integrity of a nephrotomized kidney without suture, one could avoid such inconveniences as (1) the appearance of infarcts; (2) the recidivation of stones; (3) serious lesions (fortunately rare) of important vessels caused by the suture, which are often so deceitful that they are noticed only after the operation.

To emphasize the extraordinary utility of this method, I succeeded much better in arresting the very serious hemorrhage in the case previously mentioned (the kidney was considerably altered) by surrounding the organ with a thread than I had succeeded previously by suturing even under the best technical conditions. This being the case, I tried to arrive at some device by which I could approximate the two margins of the nephrotomy incision without having to perforate the kidney and leave threads within its parenchyma.

Attempts of this kind have been made, but it is impossible to mention all of them here. The results cannot be considered good, and the methods are therefore not practiced. However, a system exists by which it is possible to avoid the worst injuries mentioned. According to this system, the kidney is sutured in such a way that the threads of catgut (someone has proposed the use of ribbons) are passed only subcapsularly, avoiding the involvement of the renal parenchyma. There is no doubt that this method eliminates many inconveniences, but it certainly does not eliminate all of them. Also the noninvolvement of the parenchyma is only theoretical. From the practical point of view, it is impossible that the cortex should not become involved.

Considering the result in the clinical case just mentioned, and analyzing the technical inconveniences, I became certain that, in order to attain my object, it was necessary to enclose the kidney in a sort of network hammock, which should surround and compress it conveniently from all sides. In my first experiments I employed a small ovoid network sack, ligating tightly the ends of the different threads of which it was formed.

A similar procedure was proposed long ago by Marcille, but the method has not been practiced, which, in view of the difficulties involved, is not surprising. A great number of the sacks was necessary, of different sizes according to the volume of the kidney to be operated on. It is insufficient that the sack be even slightly larger than the organ it surrounds, the margins of the wound do not join perfectly and hemorrhage will be arrested inadequately or not at all. Another difficulty is occasionally presented by the anatomic position of the kidney, which may be irregular and not uniform in volume or may be atrophied as a result of calculosis, so that its surface is sunken by removal of the stone. Under these circumstances, even with a hammock of the proper size exactly and with its threads properly tied, hemostasis is not complete. I therefore found it necessary to devise a hammock which would fit kidneys of any size and to invent a system which, in spite of eventual modifications of the form and anatomic alterations due to disease, would provide a perfect ligature for the kidney and a consequent complete arrest of hemorrhage.

I believe that I have solved the problem perfectly, for the following reasons: my hammock is adaptable to all sizes of kidneys. The catgut threads of which the little apparatus is made are long enough to surround the largest kidney and to remain long after ligation has been performed. The possibility of adapting a large hammock to a small kidney was attained by securing the different threads of the little apparatus among themselves. The reciprocal relations between the threads in my first hammock were stable; once the net was constructed, the position of the different threads could not be changed, and the size of the different rings was the same. In my net, however, the reciprocal relations among the threads are easily changeable, altering the form and size of the single rings and consequently the form and size of the whole sack This was accomplished by a simple system Reciprocal relations were secured between one *and the other thread through a little* knot made with a third thin thread which tied them together moderately, two and two, and allowed (as a ring would allow) the two threads to run through it easily in either direction

In consequence of this apparently insignificant change, it became apparent that once the little sack was fitted around the kidney, the perpendicular threads to its most important axis representing most of the hemostatic reconstructive power of the little apparatus, also with other threads which compress the kidney along its axis, and still others which have a cooperative relation to the first threads, are able to change position in all directions On one hand they can be managed as if they were free and on the other hand they are ligated as tightly as necessary and are usable for a kidney of any size All the threads perpendicular to the most important axis of the kidney are tied first, then follows the tying of those threads which run in the opposite direction Because these threads may be easily displaced, therefore, they can be tied in the most convenient position and adapted perfectly to the kidney's size

With such a surrounding and suspending ligature most hemorrhages can be controlled But since the median region of the kidney remains insufficiently compressed and might, in case of injury to some important vessel, still become hemorrhagic, I supplied the net with two other threads placed so as to cross the quadrilateral center of the kidney, that part not compressed by the transverse threads, these, when knotted, support the relatively unprotected area and provide adequate compression

Theoretically of course, the possibility of a displacement cannot be denied, but this is never more than minimal with regard to the threads BC B¹C¹ D, (little slips upon the margins and upon the poles of the kidney) The threads A,A¹ and E, if they were displaced a little in the medial direction, might cause some compression of the hilus which even if minimal is better avoided Therefore it is wise, after the net has been fitted and fastened, to knot tightly with thin threads of catgut (passing them below with a needle) the four points of the triple crossing a, a¹ and d, d¹ (Fig 2) The four tails of c, d, c¹ and d,¹ nearest to the renal hilus (Fig 1) can also be utilized, this is done by leading them below and medial to the aforementioned junction a, a,¹ d, d¹ turning them backward and ligating them conveniently to the relative pole of the kidney (Fig 2) To make doubly sure of stabilizing the other elements of the net, one may utilize the different tails of the knots, ligating them among themselves as desired

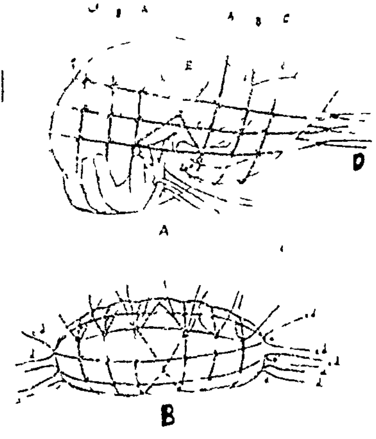
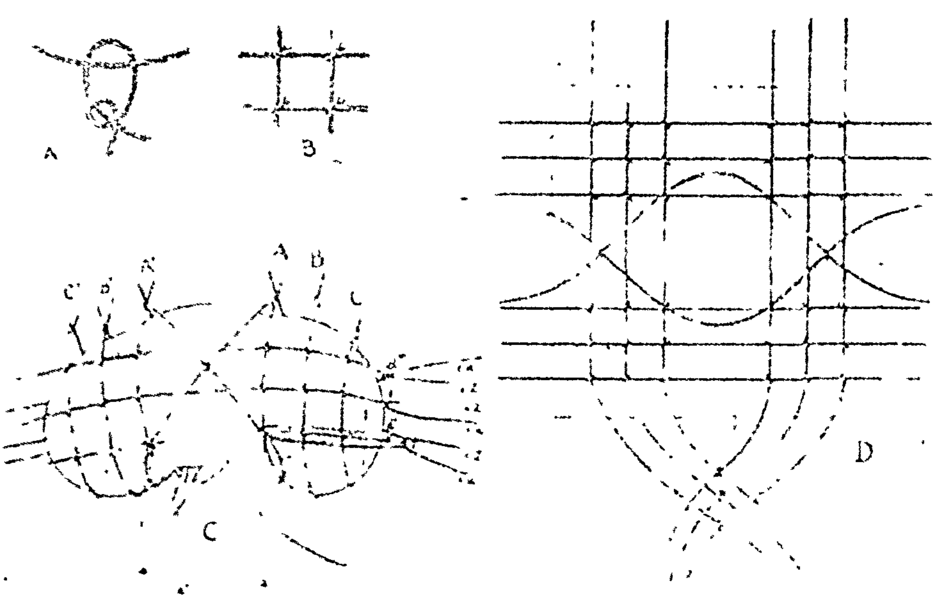


Fig 1

These additional precautions are seldom necessary for hemostasis Indeed, if it were not for the fact that there is always danger in oversimplification, it might even be sufficient to pass, one by one, the six threads A B C A¹B¹C¹ (there might, on the other hand, be eight of them or perhaps, according to the case, only four), ligating them to the convex margin of the kidney The more elaborate construction of the hammock is due to the fact



that in many cases a seriously injured kidney must be restored; also there is the desire to be absolutely sure that the threads, once put in the correct position, will not move again. This certainly is secured by the reciprocal relations of the threads and by the phenomenon of their swelling, which, after a short time, makes impossible even a minimal reciprocal movement among them.

In a rare case it may be necessary, in order to obtain an efficacious compression of the renal parenchyma equally distributed over the whole surface of the organ, to introduce beneath the threads a tampon material which, compressed by the threads, will serve a triple purpose: (1) to determine hemostatic action; (2) to compress the kidney at one or more points in which as a result of calculi perhaps, the parenchyma is considerably reduced or nonexistent, and (3) to spread the pressure and at the same time relieve threads which, without this interposing support, might possibly cause injury to tissues seriously diseased.

Another advantage of my system over the classic method of suture is that, except in rare cases in which the kidney is seriously altered, there is no excessive tightness of any thread that may cause the parenchyma to give way or to become necrotic over a period of time.

For some time, many of my colleagues (Barresi, Pracanica, La Rosa, D'Amico, Rossitto) have performed researches on biological effect of certain organic substances to be used in plastic surgery and for hemostatic operative technic. They have carried out experiments with catgut, simple or interwoven and treated with different chemical substances; omentum and other tissues also treated in different ways; fibrinogenous material, etc. Each of these researchers is publishing the results of his own work, and I myself, in a later communication, shall discuss the various surgical possibilities of these materials. For the moment it is sufficient to say that from these researches I have concluded that in the presence of very serious renal lesions and of severe superficial or deep hemorrhage, my hammock would provide a more efficacious method of obtaining uniform compression by these new hemostatic agents. I believe that such materials would combine well with my device and that the combination would succeed perfectly; certainly much better than would the classic method of suture. Whenever it might be necessary to compress single points of the kidney or the whole kidney, one or more waddings of one of the hemostatic materials, placed conveniently upon one or both surfaces of the organ, could be compressed more efficaciously by the different threads of my hammock than by the customary suture of the kidney Compression by suture is less efficacious because it is exerted in only one direction The stitches being applied at a certain level, the compression begins at that level and extends upward to the convex margin, but hemorrhage may occur at a lower level and remain outside the area of compression exercised by the suture With my system of threads to surround the kidney completely in all directions, the compressive material, in cases of serious renal alteration may be disposed in such a way as to surround the whole surface of the organ and thus the kidney may be restored even if there is parenchymal alteration in the regions near the concave margin This is an advantage not to be ignored

There remains something to be said about the technical application of my net and the use that may be made of it aside from nephrotomy

First, all free ends (which are in relation with both poles and with the convex margin of the kidney) of the threads forming the hammock must be collected, before the operation, in bundles, so that they may be handled conveniently The loops a, b, c, e, and a,¹ b,¹ c,¹ e,¹ are collected between the forefinger and the thumb of each hand and are kept at a distance sufficient to permit passage of the kidney, however large it may be (Fig 3)

Holding the net thus in both hands while an assistant upholds and directs the kidney in which temporary hemostasis has been secured by one of the common methods (traction according to Marion, rubber shod pincers, direct action by means of the fingers), the surgeon puts the net around the kidney, lowering it from the convex part toward the hilus and introducing first one and then the other pole, taking care that the ends c d correspond to the upper pole and not vice versa When the whole kidney is inside the hammock the surgeon leaves the loops a, b, c, e, and a,¹ b,¹ c,¹ e,¹ disposing them at a convenient distance and in a convenient position according to the concave margin of the organ—to both sides of the hilus He then disposes the remaining threads as seems advisable, ligating them with the proper tension, in correspondence to the convex margin When these threads are tightened hemorrhage is as a rule arrested completely If temporarily suspended hemorrhage returns even slightly, it will be arrested by the tying of longitudinal threads thanks to the system through which the different components of the net are secured one to the

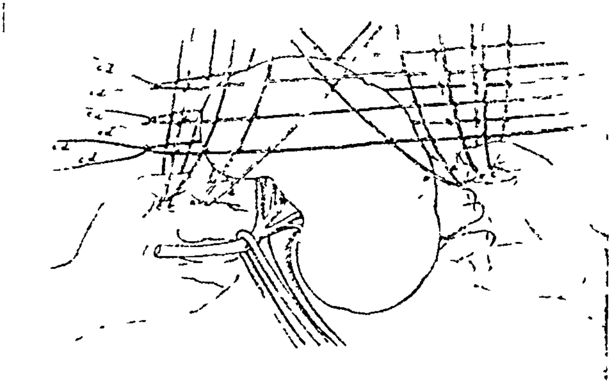


Fig. III

other, and also to the tight transverse threads, it is possible, by means of anatomic pincers, to dispose conveniently the longitudinal ones which, as mentioned before, must be knotted in correspondence to the lower pole. At last the network becomes a trellis-like case that encloses the kidney and compresses it in all directions (no suture can do this), providing sufficient compression to arrest any hemorrhage and to enable fragments of renal tissue to return to their normal position reattach themselves (Fig. 1).

If one of the plastic materials is employed, this material, after the kidney is placed within the hammock, should be disposed around the whole organ or in site that requires it and kept there by an assistant while the surgeon tightens upon it the threads of the hammock. Thus it is practically impossible, whatever the conditions, that the device will fail of its effect. Also it is nearly impossible that any considerable displacement of the different knotted loops can occur. In order to be sure that the two loops nearest to the hilus do not slip and compress its elements, the technic may be augmented by the maneuver illustrated in Figure 2: threading the tail c, d into the needle, passing it below the threads C, B, A, turning it backward in correspondence to the junction and ligating it again (knot 1 above knot d^1) with the thread coming from the junction d. The same process may be carried out at the other pole of the kidney.

The net having been thus completed, the kidney may be replaced in its site and left there or may be fixed to the surrounding tissues. In the first instance all the tails of the knots (c d, c^1 d,^{1} A B C, A^1 B^1 C,^{1} Fig. 1) are cut off; in the second they are employed to fix the kidney in the most desirable site.

From these explanations it is obvious that my net can be used not only for reconstruction of the kidney after nephrotomy but simple nephropexy. Any standard method of nephropexy can be implemented by the hammock method, more or less modified according to circumstances.

For serious or recidivant ptosis it would be possible (as it is not necessary to transfix the kidney) to strengthen the hammock by adding some threads of silk. These added threads would secure the organ better in its position than do the common stitches of catgut or the capsular flaps themselves.

SUMMARY

The author reports favorable results from the use of an original hammock device for surrounding, ligating and suspending the kidney. The hammock is so constructed as to be adjustable to a kidney of any size. It is fully described, and the technical management is explained.

In addition to its usefulness in reconstruction of the kidney after nephrotomy, the author points out its possibilities as an aid to nephropexy, its great efficiency as an aid to hemostasis, and its adaptability to all surgical conditions affecting the kidney, excepting only serious anatomic alteration. He recommends its use in combination with plastic hemostatic materials and is continuing his research in this direction.

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Results of Transplantation of the Ureter into the Intestine

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WITH regard to indications for ureteral transplantation, aside from extrophia and carcinoma of the bladder, I am convinced that the following conditions may justify the operation: vesical fistulas, incurable or extremely difficult to cure, vesical tuberculosis without involvement of the adrexae, traumatic rupture of the bladder with detachment and loss of the normal connection with the posterior urethra, prostatic carcinoma without involvement of the bladder and disturbances of vesical continence of sphincteric origin. I have performed it in all the different circumstances just enumerated except vesical trauma.

The operation may be performed on a patient of any age, though it is most satisfactory for patients who are apyretic and not too young. These are less likely to be affected by septic pyelorenal processes. Modern antibiotics of course are efficacious in the treatment of such complications if they do exist.

Patients with long standing carcinoma are the weakest subjects being sapped by neoplastic toxins as well as by complete silent occlusion of one kidney or incomplete occlusion of both often associated with some rebellious and irreversible infection. This complication fortunately is revealed by high alarming azotemia.

Sometimes, too after a completely successful transplantation, the patient dies and no cause is discovered even at autopsy.

Besides the usual researches upon the urinary system, urographic study is never to be neglected though formerly this type of examination was sometimes misleading, surgeons were inclined to decide against transplantation of any ureters that showed themselves dilated. This alone is not a contraindication. Inclusion of the conduit within the intestine is always satisfactory for thin and elastic ureters, even if they are dilated. If the ureteral walls are thickened and rigid, operation is dangerous on account of the possibility of adhesion to the intestinal tissues and is therefore to be avoided. It is vitally important to isolate and to dispose of the ureter as far as possible. Therefore the ureter should be sectioned, with scissors, as low as possible, omitting ligation of the distal end. This is a great advantage for the surgeon.

Only in case of ureterovesical reflux (which must be established preoperatively) should the vesical stump be ligated.

If possible transplantation of the two ureters should always be performed in a single stage and cystectomy carried out later. Now after preparation with an enema, opium sedation (if well tolerated) and preventive sulfathaladine and penicillin given simultaneously with operation, the Coffey No. 1 procedure is performed without enterostasis, as the sigmoid is always found empty.

A subperitoneal course is given to the ureter after its isolation, excavation being done with pincers (Klemmer) to create a subserous channel from the point of the future anastomosis to the beginning of its isolation. The distance of this passage is covered by the instrument beginning outside, where the peritoneum has already been incised to isolate the ureter, and continuing to the sigmoid where a short tract of mesosigmoid is opened. Thus not only is the normal situation restored as nearly as possible, but the best conditions are created *for preserving the ureter's vitality* and still more material is gained for the transplantation. I consider this an interesting modification of the method.

To avoid angulations and stenosis at the beginning of the transplantation, the seromuscular incision is made in a swallowtail manner and left unsutured. Only after the transplantation (which should be performed within a spacious are [illegible] the [illegible] be placed without traction or compression) is the peritoneum sewed to the end of the incision.

The ureter is fixed to the intestine with three separate stitches, which include every stitch of the suture of the two intestinal flaps. It is done first on the left side and then on the right, where, in my experience, it is easier.

After the transplantation the patient is returned to bed with a rectal tube for immediate functional control, because the ureter does not always discharge urine during the operation. The intake of large quantities of liquid is possible and desirable almost immediately after the operation, pentothal having been used to obtain narcosis. Death, when it occurs,

TABLE I

Results in Twenty-One Cases

Name	Diagnosis	Age	Method	Date	Result	Remark
1) Giuseppe A.	Vesical extrophia	24	Coffey 2	23/2/35	Recovery	Expulsion of renal stone from rectus
2) Angelica M.	Vesical extrophia	5	Coffey 1	27/5/4–	Death	
3) Francesco C.	Vesical extrophia	6	Coffey 1	13/4/43 4/5/43	Recovery	....
4) Pia A.	Vesicovaginal fistula	49	Coffey 1	18/4/43 11/5/43	Death	Necrosis of intestinal wall
5) Mario B.	Vesicovaginal fistula	43	Coffey 1	18/7/43	Death	Peritonitis
6) Antonia F.	Vesicovaginal fistula	39	Coffey 2	12/12/44 4/1/45	Recovery	... .
7) Agata M.	Vesicovaginal fistula	31	Coffey 1	11/1/44 17/2/44	Recovery	Cesarean section, well tolerated
8) Andrea Z.	Vesical extrophia (hydronephrosis)	18	Coffey 1 Nephrectomy	4/4/45	Death	Peritonitis
9) Luigi G.	Vesical extrophia	5	Coffey 1	7/12/46 30/1/47	Recovery	....
10) Pietro L.	Vesical papilloma	42	Coffey 1	1/6/47 3/7/47	Recovery	Total cystectomy
11) Pietro B.	Vesical cancer	50	Coffey 1		Recovery	Cystectomy
12) Franc. B.	Vesical cancer	56	Coffey 1	20/2/48	Death	Peritonitis
13) Anna M.	Vesical cancer	33	Coffey 1, bilateral	13/3/47	Recovery	....
14) Andrea Z.	Prostatic cancer	65	Coffey 1, bilateral	12/2/48	Recovery	+ at distance of time for cardial insufficiency
15) Bartolom. R.	Vesical cancer	65	Coffey 1, bilateral	14/8/47	Recovery	Total cystectomy
16) Franc. D.	Epispadias	28	Coffey 1, bilateral	30/10/43	Recovery	....
17) Maria M.	Retracted bladder	40	Coffey 1, bilateral	4/3/48	Recovery	Anamnesis of remaining kidney
18) Donata F.	Epispadias	24	Coffey 1, bilateral	2/10/44	Recovery	....
19) Luigi R.	Vesical extrophia	5	Coffey 1, bilateral	8/3/35	Recovery	....
20) Anna M.	Vesicovaginal fistula	40	Coffey 1, bilateral	9/3/37	Death	Dehiscence of suture
21) Michele M.	Vesical epispadias	42	Coffey 1, bilateral	18/3/48	Recovery	....

is due either to the patient's low resistance or to dehiscence of a suture that was inserted under traction

When this delicate period has passed, the greatest danger is the possibility of stenosis of the transplanted ureter, with subsequent hydronephrosis

The possibility of ascending infection exists but is certainly overestimated Stasis, which may also occur, may become the source of a descending infection On the whole, the results of this operation as observed after an adequate interval are excellent The patients have been able to sustain extreme fatigue as well as, in some cases the strain of pregnancy The salient facts are given in Table 1

SUMMARY

Ureteral transplantation, already widely used for extrophia and carcinoma of the bladder, may also in the author's opinion, present advantages in the treatment of such other conditions as vesical fistula vesical tuberculosis (some cases), traumatic rupture of the bladder, prostatic carcinoma (some cases) and disturbances of vesical continence of sphincteric origin In the author's experience the operation has proved repeatedly successful The results in 21 cases are presented in tabular form Indications and contraindications are discussed

RIASSUNTO

Ritiene che il trapianto degli ureteri, già largamente eseguito nei casi di atrofia e nei cancri della vescica trovi ulteriori indicazioni nelle fistole vescicali in taluni casi di tubercolosi nella rottura traumatica della vescica, in taluni casi di cancri della prostata, nei disturbi della continenza vescicale d'origine sfinterica L'A ha ottenuto anche in queste contingenze (21 casi) buoni risultati Discute infine le indicazioni e le controindicazioni dell'operazione

SUMARIO

La transplantacíon de los ureteres, hoy en día, se practica en casos de extrofia, y de cancer de la vejiga, pero en la opinión del autor esta operacion tambien ofrece ciertas ventajas en el tratamiento de ciertas otras enfermedades como la fistula vesical, la tuberculosis vesical, la ruptura traumatica de la vejiga, en ciertos casos de cancer de la prostata, y en la incontinencia de la vejiga de origen esfinterico El autor presenta los resultados de esta operacion en 21 de sus casos, y es su opinion que esta operacion ha sido de gran valor en el tratamiento de estos casos Tambien discute las indicaciones y contraindicaciones de esta operacion

SOMMAIRE

La transplantation urétérale employee pour l'extrophie et le carcinome de la vessie, presente d'après l'opinion de l'auteur des avantages dans le traitement d'autres cas tels que la fistule vesicale, la tuberculose vésicale et les troubles de la continence vésicale d'origine sphincterique D'après l'auteur, les résultats ont toujours eté satisfaisants Les résultats dans 21 cas sont presentés Les indications et les contre indications sont discutées

Ureterosigmoidostomy in Cases of Serious Obstinate Cystitis

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THE type of transplantation of the ureters which is commonly practiced in urology and surgery is the transplantation into the sigmoid (ureterosigmoidostomy), an operation which is linked with the name of Coffey, who established the technic with successive modifications known as Coffey's first, second and third method in cases of ureterosigmoidostomy. This operation is chiefly indicated in cases of carcinoma, diffused papillomatosis and vesical extrophia, and also in total epispadia and some unoperable vesicovaginal fistulae.

Franceschini recently called attention to the possible indications of ureterosigmoidostomy in case of ureterectasis due to pelvicellulitis—salpingitis—extended carcinoma of the uterus.

But I would like to stress those pathological conditions in which ureterosigmoidostomy, even if less indicated, is followed by the same brilliant result: *tuberculous and not tuberculous cystitis, cause of intolerable pains, resisting all other treatments,* and to which belong the following, two personal cases.

CASE HISTORIES

Case 1: Serious Obstinate Cystitis After Tuberculous Nefrectomy.

Turchi M., aged 38, housewife from Arpino—family history negative, married, mother of healthy children, had right pleuritis at the age of 17. Seven years ago she had cystitis—pyuria, hematuria on which account she submitted to a right nephrectomy due to tuberculosis. But the cystic disturbances did not disappear nor diminish wherefore she was operated on again after six months by the same urologist who performed the resection of the presacral n.

For about a month the intolerable cystic pains decreased slightly; then stranguria, tenesmus and frequency of micturition returned more intense than before reaching such a high degree that the patient took morphine for some years without parsimony, paying high prices with serious financial damage. When it became impossible to get the drug the patient came to the hospital of Arpino to consult me.

In questioning her, it was found that the pains were caused exclusively by the very frequent and painful miction. There were neither azotemic signs nor pains caused by the right remaining kidney. I proposed the implanatation of the right remaining ureter into the sigma which the patient accepted immediately and which was performed very easily in May 1946, employing Coffey's method No. 2, after having discovered a normal ureter which was not dilated nor infiltrated. This is a very important fact and also a strange one, considering that the ureter had been sectioned a few centimeters distant from a bladder which was for six years the site of a serious phlogosis.

The postoperative course was ideal and the result most brilliant. Ceasing miction the pains also ceased, morphine was given up spontaneously after a short time and the patient looked well.

I visited her in 1948 and she was very healthy.

Case 2: Di Domenico, A., aged 31, housewife, from Capistrello. Her family history was negative. She was married and had three children. Ten years ago, after the last pregnancy (application of forceps), vesical disturbances began which increased continually, resisting all treatments prescribed by physicians and specialists.

For a year the patient was urinating every 10 minutes. Often she discharged with great pain, hematic urine of ammoniacal odor.

Clinical Examination: Good general conditions, reddening of the external genitals which were wet from urine.

Jan. 16, 1947: Cystoscopy vesical capacity very much reduced (20 cc.); reddened mucosa easily bleeding with frequent accumulation of fibrin. Very extended ulceration of the cupola covered with fibrin and on the right half of the trigone which is intensely edematous. The neck is uniformly reddened and bleeding. The openings within the region of the edema are enlarged.

Chromocystoscopy: No elimination of color after 15 minutes.

Examination of the Urine: Alkaline reaction, specific gravity 1020; albumin present; no glucose; no biliary pigments. Urea 17,40 percent; sediment: very much dissoluted leukocytes; many erythrocites; filaments of mucus.

Research for Koch's Bacillus Negative Azotemia 0,66 percent, pressure 125x90

Jan 21, 1947 Cystoscopy revealed previous rachianesthesia

The foregoing findings are confirmed any attempt to extend the bladder fails, the introduced water, reaching at most the quantity of 20 cc, is pushed back

Catheterization of the Ureters At right, after about 2 cm, the catheter is arrested, at left being arrested more times, it ascends for about 4 cm

Jan 22, 1947 Urography—good elimination on both sides, the renal regions are in situ the right kidney is slightly enlarged the left ureter is normal, the right ureter dilated, contracted bladder of the volume of a nut, the juxta vesical portions of the ureter appear, for a length of two cm, thin, filiform

Diagnosis Cronical obstinate cystitis with right ureterectasis and partial incontinence of urine

Bilateral implantation of the ureters into the sigma according to Coffey's method No 2 is performed very easily since the intravesical tract is not dilated The bladder appears like a rubber ball, full and with steep walls, rigid and with pericystitis

The operation was completed by sterilization (section of the salpinx) and appendicectomy (Jan 25, 1947)

The postoperative course was ideal and at the ninth day the catheters were pushed out spontaneously from the rectus together with abundant discharge of urine and feces accompanied by pains like those of childbirth

May 2, the patient was dismissed She was visited again on May 10, 1948, and her general condition was excellent

The two cases reported above are not enough and too recent to allow conclusions However they help to increase the number of these operations which are performed rather seldom I feel authorized to call the urologist's and the surgeon's attention to the utility of this operation also in cases of tuberculous and non tuberculous serious, obstinate cystitis The result showed the exactness of the indication for ureterosigmoidostomy in this case

In both cases the medical treatment failed and no other operation could be tried upon a bladder whose volume was thus reduced and whose walls were sclerotic full of ulcerations and fibrous sediments with the urine containing ammonia, cause of pains or, better, painful spasms which made impossible conjugal as well as social life

The deviation of the urine into the rectum changed the lives of these patients, who accepted the new condition as "slightly uncomfortable' and not painful at all

Furthermore, on account of the complete rest during the operation the bladder recovered without any treatment!

Certainly, an operation charged with a mortality of about four to 30 percent cannot be advised lightly But I am sure that experienced hands operating upon patients with good renal functionality may reduce the figures of operative failure due to disunion of the implantation considerably

Nicolich recently arrived at similar conclusions operating with success and obtaining excellent results in four cases of tuberculous cystitis persistent after nephrectomy He remarks that in cases of serious tuberculosis and not tuberculous cystitis with a minimum of vesical capacity tenesmus false incontinence intolerable life ureterosigmoidostomy proved to be the operation of choice, eliminating pains and returning normal life to the patients

Regarding the results objectively of the possibility of suppurative ascendant pyelonephritis which after a few years causes death, it must be recognized as an operation of necessity and that in order to avoid or to delay such complications it must be attempted as soon as possible (after unsuccessful submission to medical treatment) before the ureters become too enlarged

In literature we find results of cases of bilateral implantation not too fatal performed generally for vesical extrophia

One patient of Estes survived 24 years, one of Hammer's died after 10 years on account of cancer of the sigma originating within the site of the implantation A patient of Estor's revisited after 25 years was well, the same result occurred in a case of Oppel's after 15 years, Peter's after 26 years, and the three cases of Gordon's respectively after 21, 22 25 years A case of Roux's after three years showed a slight dilatation of the right pelvis Turner visited eight of the patients 7, 10, 15 years after the operation

It must be also considered that modern treatments with sulfaguanidine and penicillin keep the urinary system free from ascendant infection, and that the patients encouraged by brilliant results, come to be operated on immediately after medical treatment.

The present as well as the future results depend on the condition of the ureter.

SUMMARY

I am of the opinion that it is wrong to be in apprehension about ascendant infection in these operated patients caused by the new situ of the ureteral opening and by the lack of the uretero-vesical sphincter. It is doubtful if the sigma is really more infected than a bladder reduced to a small reservoir of ammoniacal purulent urine, site of spasms which are very important in the determination of the vesico-ureteral reflux. As I am also of opinion that it is impossible that nature was so sparing of sphincters within the ureter when we know that the radiologists, thoroughly studying the intestine, have found so many of them.

Certainly, lacking its vesical sphincter, compensation will occur within the muscular tunic of the implanted ureter, if its walls are not altered.

Operating late—when the ureters are already enlarged and infiltrated—when technic becomes more difficult and the future is hidden—surgery is unjustly defamed!

RIASSUNTO

Ritiene che sia errato un eccessivo timore di infezioni ascendenti nei pazienti operati di trapianto degli ureteri. Per quanto riguarda i germi, e' discutibile se il sigma e' realmente piu' infetto di una vescica ridotta ad una piccola saccoccia di urina ammoniacale, purulenta, sede di spasmi che svolgono un'azione assai importante nella provocazione del riflusso vescico-ureterale. In quanto alla mancanza di uno sfintere nelle sede del nuovo impianto, l'A. dubita che gli ureteri siano completamente sprovvisti di anelli muscolari, dato che anche nell'intestino i radiologi hanno scoperto tanti sfinteri. Se le pareti degli ureteri non sono troppo alterate, la mancanza dello sfintere vescicale verra' compensato dall'azione delle tuniche muscolari degli ureteri stessi. Questo tipo di operazione he incontrato molti oppositori appunto perche 'il trapianto degli ureteri viene generalmente eseguito troppo tardi, allorquando sono gia' troppo distesi e troppo alterati da processi infiammatori.

SUMARIO

En mi opinion es un error el preocuparce mucho de las infecciones ascendentes de las vias urinarias en los casos de transplantacion ureteral, por razon misma de la nueva apertura, o de la falta del esfincter vesicoureteral. Es dudoso que el sigma es en realidad un sitio de mayor infeccion, que la infeccion que es natural de la vejiga reducida a un pequeno reservorio cuyo contenido es una orina purulenta.

Es logico el deducir que la falta del esfincter vesical sera compensado por la misma tunica muscular del ureter que ha sido implantado, siempre y cuando sus paredes no han sido alteradas. Las operaciones que se practican en casos ya avanzados, cuando los ureters han sufrido gran dilatacion y sus paredes estan infiltradas por el proceso patologico, creando asi grandes dificultades tecnicas, favorecen un prognostico incierto y solo sirven para difamar a la cirujia injustificadamente.

SOMMAIRE

L'auteur exprime l'opinion qu'il n'est pas douteux que l'infection ascendante de l'urèthre soit dûe au nouveau siège de l'uretère et à l'absence de sphincter radial vésical. Il est douteux que l'anse sigmoïde soit plus infectée qu'une vessie agissant comme réservoir d'ammoniac d'urine purulente ammoniacale. Il n'est pas possible que la nature n'ait pas fourni de sphincters à l'uretère parce que les radiologistes nous montrent que l'intestin a beaucoup de sphincters.

Dans la musculature de l'uretère implanté si les parois ne sont pas trop altérées, il y aura compensation à l'absence de son sphincter vésical. L'opération tardive quand les uretères sont deja dilatés et infiltrés, est plus difficile et le pronostic plus incertain. La chirurgie des uretères ne mérite pas une mauvaise renommée.

Prostatic Hypertrophy

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MERCIER once observed keenly that Hippocrates, noting the great frequency of urinary disease in aged persons, was wise in not attempting to explain the cause. Cooper arrived at the same conclusion. They were probably right. Not only the cause of prostatic hypertrophy but many other questions in this field remain unanswered. With the discovery by Ferry and Lacuna of the "caruncle" within the vesical neck in aged subjects, the problem seemed to have been solved; it was natural to ascribe the difficulty or impossibility of micturition to the obstructive effect of such masses.

The mechanical theory derived from that discovery has lasted, undiscussed, almost up to the present time, that is, until prostatectomy established the nonexistence of any relation between the volume of the adenoma and the intensity of the symptoms, as well as the failure of complete closure of the vesical orifice in prostatic disease, in which the adenomatous masses frequently leave open wide spaces between their irregular and bumpy surfaces of contact.

Later researchers brought forth a great number of different theories, but no one of them in itself is sufficient to explain the symptoms in all cases. Most researchers, therefore, are compelled to entrench cautiously. They conclude that, although prostatic retention often is caused by the mechanical obstacle of the adenoma, it may also be due to a complex of conditions which, either alone or together with the adenoma, reduce the expulsive power of the bladder or hinder the free course of urine.

To mention all the causes suggested would take much time. To indicate only a few of them, however, may be of interest. They are the inhibitory reflexes, the essential failure of contraction, and the senile involution that causes morphologic alterations of the muscular fibers (expansion, division, sclerosis). The urethra has been accused of changes of form and length, valvular anomalies, reflex contractions, inflammation and hypertonia. Within the vesical neck, presumable causes were found in congestion, rigidity, hypertrophy, hypertonia, sclerosis, nervous alterations, etc. These lesions, it was assumed, would naturally take on a more serious aspect if their evolution and their effects were considered in relation to the adenoma.

Few researchers ascribed retention exclusively or preponderantly to a single factor. Guyon, on the basis of his observations and of Ciechanowski's anatomicopathologic researches, postulated that prostatic retention is connected with general arteriosclerosis, which, invading the vesical muscle, causes *atrophy* or paresis. According to Li Virghi, retention is caused by a lesion or lesions of the sphincteric vesical fibers, which, having lost their elasticity, relax before the bladder is completely emptied; a certain quantity of urine remains within the bladder, increasing with the progress of the lesions. He does not define the origin of these lesions, but suggests an inflammatory hyperplasia that finally changes the muscular fibers into connective tissue.

The Serralachs of Barcelona distinguish two types of dysuria: one caused by hyperplasia and the other by hypoplasia. In the first type Belle's muscle, weakened by adenomatous infiltration, is unable to open the orifice because its traction upon the posterior margin is insufficient. In the second type, the structures concerned with opening the orifice are healthy and function well, but the orifice itself, made rigid by sclerosis, withstands their traction.

Legueu, whose ideas are those most widely accepted, says that prostatic disease in general is a disease of the vesical neck, characterized by hypertrophy of all its elements, mucosal, [illegible] fibrous. On [illegible] of this hy[illegible] vesical [illegible] rigid, [illegible] to open, a function that is indispensable to normal micturition.

Guyon's theory, nowadays, has only historic interest. Arteriosclerosis has lost much of its importance through recent anatomicopathologic researches. Inadequate sphincteric contractility has been refuted by the restoration of normal micturition after prostatectomy, as well as by certain cystometric investigations. Dysectasis did not even convince its own advocate, Legueu, in fact, now admits that it does not explain either complete retention or the strange phenomenon which does not permit the passage of even a drop of urine through the orifice and yet permits the comfortable introduction of one, two or even three fingers, as in prostatectomy.

All theories, those mentioned as well as those omitted for the sake of brevity, presuppose that the urethrovesical sphincter controls, through its tone or contraction, the closure of the bladder; that such tone or contraction ceases to exist during the act of micturition because of relaxation of the fibers and also, as more recent researchers are inclined to agree, because of active opening of the sphincter. Relaxation or failure to open would therefore be the cause of the disease. If this were really true, the conditions in a case of prostatic hypertrophy would be the same as those in a case of urethral restriction, and the catheter entering the bladder would have to overcome a resistance stronger than that which is met in a normal subject. The patient would have to effect an intense contraction during micturition in order to expel a very thin jet of urine or even a few drops.

Instead, the very opposite is true. The resistance opposed by the smooth sphincter to the catheter is minimal and sometimes nonexistent, and the patient knows very well that, if he is to urinate, the contraction must be as weak as possible. The urine of patients with prostatic hypertrophy has a negligible trajectory owing to a lack of propulsive power in a nearly normal volume as the vesico-urethral orifice remains wide open.

Unfortunately, the difficulties of explaining the urinary phenomena of prostatic disease cannot be overcome until the real mechanism of normal micturition is known. This mechanism, I am convinced, is very different from the one generally accepted. My conviction has led me to the opinion that prostatic disease itself is different from the generally accepted pattern.

Let us begin with anatomy. The existence of a particular or autonomous structure of the smooth sphincter cannot be denied; also, the question is still complicated and confused. But it is also true that the circular fibers of the median layer of the gladder, thickening little by little as they descend, eventually form a strong, complete ring around the vesical orifice of the urethra.

Alesio describes this orifice as "surrounded by a border of a certain thickness and followed immediately by the urethral canal with its initial part surrounded by the smooth sphincter, which extends 12 to 15 mm." Now it is obvious that the orifice, as a direct continuation of the bladder, does not relax, but must be contracted instead, when the bladder is discharging urine. The orifice, however, is not connected only with the bladder. Many fibers of the smooth sphincter cross it, and other muscles become attached to it. It is merely a part of the complex of muscular fibers composing the vesical neck. Many of these fibers are antagonistic to those of the ring, opposing its contraction and reducing it, sometimes considerably, but never eliminating it by a complete opening of the orifice; for the sphincter continues its resistance during micturition rather more energetically than it does during the state of rest.

In my opinion, what occurs during micturitation is something like this: the orifice at first, on account of synchronous contraction about the detrusor, keeps the bladder closed; immediately afterward the antagonistic muscles begin to act, weakening the tendency to closure until the urinary impulse succeeds in opening the orifice.

We seem to be dealing, therefore, with an orifice that resists more or less actively during micturition and increases its resistance in direct proportion to the contractions of the bladder. If this did not occur, we should be able to change at will the volume and the trajectory of the jet of urine. Instead, as can be demonstrated easily, the maximum trajectory is reached by an impulse of average intensity, and no effort is capable of lengthening it by so much as one centimeter. This is true precisely because the increased pressure of urine is opposed by a proportional limitation of the passage, and this explains why increasing and contraction of the detrusor increases also that of the orifice

We are accustomed to believe that the chief task of the smooth sphincter is the closure of the bladder; but it is more than likely that this muscle functions in micturition in a more important way In fact any pathologic fluid emerging from the urethral tract between the two sphincters, even if copious (as in hemorrhage), may pass into the bladder very easily, causing no sensation of tension; the same would happen to the spermatic fluid if the smooth sphincter being vigorously contracted, did not participate in [illegible] ejaculation.

Finally, entering [illegible]ologic field, let us say that prostat[illegible]trophy affects only aged persons becaus[illegible]old persons that we observe a loss [illegible]um between the expulsive power [illegible]r and the closure of the sphincter [illegible]um that is indispensable to [illegible]tion. The two phenomena are [illegible]pproach each other, and often [illegible] is inverted, thus permitting [illegible] of all the urinary dysfu[illegible] this disease.

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Through [illegible] I have been able to dem[illegible] pressure is measured [illegible] during contraction [illegible] the aged and in patients [illegible] values. In tention is [illegible] normal subjects and is alwa[illegible] necessary for micturition. [illegible] the difference above refer[illegible] of proportionately equa[illegible] muscle fibers in the two [illegible] which the orifice is contracted [illegible] that is disproportionate to [illegible] contraction. This appears

according to the degree of alteration of the equilibrium, *one of the three characteristic states of prostatic hypertrophy:*

1. *The sphincteric resistance is increased but the detrusor is still able to dominate it, though with difficulty, requiring increased time and repeated effort.*

2. *At the beginning of micturition the vesical pressure succeeds in opening the orifice, but subsequently, as the contraction increases in an effort to evacuate the bladder, the sphincteric pressure of closure finally prevails, interrupting the discharge of the urine (period of incomplete retention).*

3. *The preponderance of the orifice is manifested at every degree of contraction until not a single drop is expelled spontaneously (period of complete retention).*

Something like incomplete retention occurs sometimes in healthy persons also. During greatly delayed micturition the jet is interrupted before the bladder is emptied, and no effort can make it appear again. To get rid of the remaining urine it is necessary to interrupt that contraction and to begin another, very weak one. This phenomenon differs from actual retention because it is of functional origin and transitory, but it can be explained by the same mechanism. As the volume of intravesical urine decreases, the detrusor tired from prolonged distention, requires a constantly increasing stimulus to maintain contraction.

The expulsive stimulus finally [illegible] the defensive power of the orifice [illegible] normally [illegible]. The new contraction, which is very weak, has only restored the equilibrium that was interrupted by the initial, too strong contraction. The increase of resistance of the orifice during micturition is proved by [illegible] in which there is involuntary loss of urine, caused by the moderate pressure of the overdistended bladder, while the much stronger pressure of voluntary contraction does not permit a single drop to be expelled. Still more convincing are the results of a simple experiment, performed by myself in many cases of prostatic disease during the period of complete retention.

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Finally, entering the pathologic field, let us say that prostatic hypertrophy affects only aged persons because it is in old persons that we observe a loss of equilibrium between the expulsive power of the bladder and the closure of the sphincter, an equilibrium that is indispensable to normal micturition The two phenomena are inclined to approach each other, and often their relation is inverted, thus permitting the development of all the urinary dysfunctions peculiar to this disease

The cause is the different course taken by senile involution of the orifice and that taken by the same process in the rest of the bladder The former is thicker and provided with a better circulation, therefore it is less affected by the injuries of time, as can be shown by cystoscopic examination and still better at autopsy But this difference does not, as might be assumed, cause an essential failure of contraction of the bladder

Through personal researches I have been able to demonstrate that vesical pressure, as measured with the cystometer during contraction, is only a little lower in the aged and in patients with prostatic disease (unless distention is severe) than in the normal subject, and is always higher than is necessary for micturition The consequence of the difference above referred to is the need of proportionately equal reactions to the stimulus itself in the two sectors, in other words, the orifice is contracted to a degree that is disproportionate to detrusor contraction Thus appears, according to the degree of alteration of the equilibrium, one of the three characteristic states of prostatic hypertrophy

1 The sphincteric resistance is increased but the detrusor is still able to dominate it, though with difficulty, requiring increased time and repeated effort

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Something like incomplete retention occurs sometimes in healthy persons also During greatly delayed micturition the jet is interrupted before the bladder is emptied, and no effort can make it appear again To get rid of the remaining urine it is necessary to interrupt that contraction and to begin another, very weak one This phenomenon differs from actual retention because it is of functional origin and transitory, but it can be explained by the same mechanism As the volume of intravesical urine decreases, the detrusor tired from prolonged distention, requires a constantly increasing stimulus to maintain contraction

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By means of a hydromanometer inserted into a catheter I measured the vesical pres sure at the different levels of repletion while the patient was trying to urinate. Having removed the catheter, I began a urethrovesical irrigation by means of Janet's common cannula, measuring the height of fluid leaving the bladder in order to determine the amount needed to insure comfortable passage. Comparing the resultant figures, I noticed that (1) the level reached by the manometer in all cases amounted to about 150-170 cm.; (2) there was no significant variation in volume of the liquid within the bladder of the same subject; remarkable decrease of pressure was noticed in subjects with considerable retention, but only when the vesical liquid was reduced to a few deciliters, and (3) the height of the liquid column in the reservoir at the second test was always less than that in the manometer.

Between the two values the relation was 1: 1½, 1:2, and 1:3, and in some cases there was even greater difference.

It is evident that, in subjects affected by prostatic diseases, failure of the urinary pressure does not occur even when the bladder contains but a small quantity of urine. It must therefore be admitted that retention is caused by the stronger contraction of the orifice.

There is no doubt that in the presence of prostatic hypertrophy valvular closure by the adenoma must be excluded; but this, as is well known, exists only in rare cases. The second part of the experiment confirmed my theory that the orifice during the state of rest offers less resistance than it does during micturition. It may be objected that in carrying out these experiments I took a course that was opposite to the natural one; but, so far as I know, variation in the behavior of the sphincter resulting from the direction in which it is crossed has never been established.

As for the adenoma, is it not strange that of so many glands, located in so many parts of the human body, only those which are intrasphincteric become hypertrophic at a certain age, and that many persons not affected by prostatic disease or other serious disturbance should also be afflicted with adenomas?

Two theories have been advanced to explain the formation of an adenoma: the inflammatory theory and the endocrine theory. On the basis of the inflammatory theory, the chief cause would be gonorrhea. Chronic prostatitis would be followed by adenomatous change of the intrasphincteric, submucous glands. If this is accepted, it remains inconceivable why the effects of gonorrhea, which may be contracted at any age and even at birth, should be delayed until the victim reaches the age of 55 or 60 years. Moreover, I have noticed that, among patients who suffer from prostatic disease, gonorrhea is rare.

The endocrine theory, supported by Hutter, Moszkowicz and Cuneo, is based on the origin of the prostatic utricle and the surrounding glands: These formations are the feminine part of the prostate; after the age of 50 years, on account of the testicular decrease of endocrine secretion and the weakening of sexuality, these glands proliferate, causing adenoma.

This theory, very seductive at first sight, does not stand the test. Marion justly points out that, while the utricle with its glands is situated below and outside the sphincter, the adenoma is situated within it. Champy points out that castration in animals leads to atrophy, not hypertrophy, of the prostate. And finally there is the treatment of cancer of the prostate; by evacuation of the testis and administration of estrogen (natural as well as synthetic), satisfactory results are obtained even in cases of hypertrophy.

The ideas just expressed and their neglected but significant possible relation to the adenoma, which gradually incapacitates the bladder, causing first the quick regress of its volume and changing it later into fibrous tissue, thus making removal of the tumor very difficult, all tend to confirm the belief that the contractions of the sphincter, becoming more violent in old age for the reasons already explained, may act upon the glands like repeated mechanical stimuli, exciting them so as to cause hypertrophy.

I am of the opinion that constipation, which is often one of the forerunners of prostatic disease, may also be a positive factor in the development of adenoma, since the smooth sphincter participates vigorously in the effort required for strong and prolonged contractions.

These suggestions may have no more than

the value of a simple hypothesis, although they are based on observations of actual phenomena and seem capable of explaining many facts hitherto unknown. I intend to continue this study in the hope of making some advances in the therapeutic field. If my theory should prove correct, normal or approximately normal micturition could be restored by merely destroying the continuity of the smooth sphincter by incision or, better, removal, in the treatment of a patient with prostatic disease.

Thus far I have not decided upon my approach. Both the perineal and the prevesical route have their advantages and their disadvantages and only practice can determine which is preferable.

Since I am dealing exclusively with private patients, I hope that colleagues who have wider opportunities, if they find in my argument some basis of probability, will interest themselves in similar studies in the near future. I think it well worth while to collaborate in an attempt to restore health to the many unfortunate patients who can obtain no benefit from prostatectomy.

SUMMARY

Hypertrophy of the prostate and of other intrasphincteric glands is discussed from the point of view of mechanical counteraction between the sphincter and the detrusor muscles as it affects micturition. The theory is advanced that an alteration of the normal equilibrium between these muscles may be the exciting cause of prostatic hypertrophy. This idea, supported by laboratory tests and clinical experience, suggests the probability that normal or approximately normal micturition could be restored to a patient with prostatic disease by surgical interruption of the continuity of the sphincter.

RIASSUNTO

Dopo avere discusso le condizioni meccaniche che creano un equilibrio tra l'azione dello sfintere e dei muscoli detrusori, influendo così sopra il meccanismo dell'urinazione, l'A. avanza l'ipotesi che uno squilibrio nell'azione di questi muscoli rappresenti la causa determinante dell'ipertrofia prostatica. Quest'ipotesi, suffragata da prove di laboratorio e dall'esperienza clinica, convalida la possibilità che una soluzione di continuità dello sfintere vescicale ottenuta con mezzi chirurgici possa ripristinare una minzione normale in pazienti affetti da ipertrofia prostatica.

SUMARIO

El autor discute la hipertrofia de la prostata y otras glandulas intraesfinterianas bajo el punto de vista de interaccion mecanica entre el musculo del esfinter y el detrusor en sus relaciones con la micturicion. Se formula la teoria. La alteracion del equilibrio normal en el funcionamiento de estos musculos puede ser la causa excitante de la hipertrofia de la prostata. Esta teoria del autor, segun el, esta soportada por la clinica y por el laboratorio, y sugiere la posibilidad de la restauracion de la micturicion normal en los prostaticos, por la interrupcion quirurgica del esfinter vesical.

SOMMAIRE

L'hypertrophie de la prostate et d'autres glandes intrasphinctériennes est discutée au point de vue de l'antagonisme existant entre le sphincter et les muscles détrusseurs par rapport à la miction. L'auteur avance la théorie que l'altération de l'équilibre normal existant entre ces muscles, peut être la cause déterminante de l'hypertrophie. Cette conception supportée des épreuves de laboratoire et par l'expérience clinique, suggère la probabilité que la miction normale ou presque normale peut être restaurée par l'interruption chirurgicale de la continuité du sphincter, chez les malades souffrant de la prostate.

Mesenteric Lymphadenopathies*

FERNANDO ASENCIO, M.D., F.A.C.S., F.I.C.S.
BAYAMON, PUERTO RICO

SINCE our first experiences with acute regional enteritis, regional ileitis, or regional ileocolitis, the lymphatic system has impressed us as the fundamental phenomenon of causation.

The anatomy of the lymphatics is well described and much is written about the practical considerations with reference to tuberculosis and cancer, but very little is definitely stated in the literature about the physiological applications of the lymphatic system with relation to disease or inflammation in the abdomen. The pathological physiology of the lymphatic system of the intestinal tract is poorly understood because of the lack of correlation between experimental and surgical experiences.

Intraabdominal lymphadenopathies are puzzling experiences which one often encounters associated with nutritional deficiencies, parasites, regional enteritis, tuberculosis, abdominal Hodgkin's disease, and malignancies. It is my personal observation that mesenteric lymphadenitis is the commonest disease among undernourished children. It is associated with abdominal colics or appendicitis.

This finding in the operating room calls for theoretical questioning. Does infection create a sensitization phenomenon in all the lymphatic system of the body, or a localized cellulitis process in one determined system? What is the true physiological function of the lymphocyte? Is lymphadenopathy generalized or localized in areas? This naturally leads to a probable seat of pathological processes in the lumen of the intestine, but not necessarily so.

Pathologists seem to accord lymph nodes an infinitesimal part of their value. In their studies of intestinal material they rely mainly on the fact that a lymph node will respond pathologically as:

1. Lymphoid hyperplasia.
    1. Follicular hyperplasia.
    2. Reticulum hyperplasia.
2. Reactive lymphadenitis (inflammation).
    1. Sinusoidal dilatation.
    2. Suppuration—cell invasion (polynuclears).

We know of the theoretical function of the lymphatic system as a protective purifier of toxic substances, and bacteria from circulation. For the Puerto Rican who thrives on the lowest levels of food requirement, and who has to fight infections and parasites as well, it is his best means of adaptation. It is generally accepted that the lymphatic system attains its maximum development in childhood. This is seen in the tonsils, the adenoids and the respiratory diseases so common in children. As the individual grows older the lymphatic system becomes much more inactive on the respiratory system but attains its greatest development in the gastrointestinal tract where he copes with metabolism, nutrition, and selective absorption of foods. The liver is the greatest source of lymph production. The lacteals and the villi become more permeable to fat absorption.

Gastroenteric disorders are common, so that with the development of each organ, a corresponding set of filters are also developed to care for drainage of excess fluids.

In Puerto Rico the humid tropical environment does not help a physiological adjustment to the lymphatics. Common diseases of every day experience, such as filaria schistosomiasis, parasitic intestinal infestations, lymphogranuloma inguinale, and tuberculosis will also affect other anatomical regions of the lymphatic system as well as the visceral organs. Consequently, filariasis, scrofulous cervical adenopathy, ascariasis dermatitis and skin pathology will harm the extravisceral lymphatics altering their structures. The pleura and the peritoneum are, so to speak, more reactive to respiratory and oral infections, because the peripheral lymphatics are more often injured.

I have not ceased to emphasize that much of our surgical experience among impoverished people [illegible] because [illegible] clinical [illegible] to [illegible] system. [illegible] infect[illegible] more adap[illegible] trauma. [illegible] from [illegible] my fa[illegible] Re[illegible] [illegible]duals in [illegible] [illegible]al in[illegible] to [illegible]

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*From the Bayamon Charity Hospital, Bayamon, Puerto Rico

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This personal experience is consistently proven on surgical explorations. The most virulent appendicitis need not produce reactive mesenteric adenitis. However, the tendency to the deposition of fibrinoplastic exudates and the higher incidence of appendiceal abscesses, more often observed in devitalized individuals, will encourage reactive mesenteric adenopathy. In these cases there is a higher incidence of postoperative adhesions and chronic recurrent intestinal obstruction.

SUMMARY

An attempt is made to correlate our large incidence of mesenteric adenopathies among our debilitated individuals with a factor of adaptation and clinical behaviour in surgical practice.

A theory is brought forward that mesenteric lymphadenopathies in the abdominal cavity is a pathological reactive hyperplasia to the constant injuries that the lymphatic peripheral system suffers, in the tropics.

SUMARIO

Una relación entre las adenopatías mesentéricas tan comunes en nuestros pacientes debilitados y el factor de adaptación clínico a nuestras experiencias quirúrgicas.

Se expone una teoría de que la hiperplasia mesentérica en la cavidad abdominal es un mecanismo patológico, en que el organismo, reajusta al trauma que recibe constantemente en el sistema limfático periferal en los trópicos.

SOMMAIRE

D'aprés notre experience chirurgicale on présente una corrélation entre les adenopathies mésentériques, assez frequentes dans nos málades débilités et un element d'adaptation clinique.

On expose une théorie dans la dessein de demonstrer que l'hiperplasic mésentérique trouveé dans les tropiques est un mecanisme pathologique dans lequel l'organisme s'adapte aux traumatismes qu'il recoit constanment dans le systéme lymphatique pérphérique.

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Those who have not sent in their new address or proper teaching affiliations will please do so immediately. All United States chapter members should send such data to 1516 Lake Shore Drive, Chicago, Ill. International members should write to the Secretary General, Dr. Max Thorek, 850 W. Irving Park, Chicago 13, Ill., U.S.A.

Megacolic Artificial Anus in Pathologic Segment Hirschsprung's Disease

FERIDUN SEVKET EVRENSEL, M.D.
ISTANBUL, TURKEY

IN two cases of Hirschsprung's disease in which resection did not seem indicated we conceived the idea of creating instead of a cecal fistula a fistula on a segment of the megacolon itself, and performing in a second stage procedure (after the patient had gained weight and his general condition had improved) a radical colectomy including the fistulized part and followed by the necessary anastomosis.

The technic as applied in these two cases proved to have had great advantages especially in case of performance and the results were so satisfactory as to justify publication.

CASE REPORTS

Case 1. I. A., a boy aged 10, was admitted to our service on March 19, 1946 with classic symptoms of Hirschsprung's disease. Atresia ani had prevented defecation for seven days after his birth. At that time that atresia was surgically treated at the regional hospital of Ismit, but defecation remained irregular, periods of obstipation alternating with rare periods of incontinence. This irregularity persisted until the child's admission to my service. The immediate complaint was of progressive swelling of the abdomen, together with a steady loss in weight.

Clinical Examination. The child was very thin, his height was 1.29 m., his weight 29 Kg., he was dehydrated, and his muscular tonus was reduced. There was hypochromic anemia (red cells, 2,820,000, Hgb. 42 percent). The circulatory system was normal. Owing to increased intra-abdominal pressure there was slight dyspnea, with congestive sounds over both lungs. The abdomen was distended and hard making palpation difficult. The liver was displaced upward, its absolute dullness to percussion beginning in the fourth intercostal space. The anus was narrow, making even the introduction of the fifth finger impossible.

Direct roentgen examination showed nothing pertinent and a barium meal was administered. This induced signs of occlusion, which grew steadily worse, until on the third day the clinical picture of complete occlusion was present. The child's general condition deteriorated. The pulse was bad and dyspnea had increased. A dilatation of the anus, performed as a palliative action, failed to induce defecation. Under these circumstances a laparotomy was thought necessary. Because of the patient's poor condition, we undertook this laparotomy with the sole intention of establishing a cecal fistula. Opening the abdomen, however, we observed an extremely distended segment of colon occupying the entire abdominal cavity and impossible to displace. We were therefore compelled to establish the fistula on this segment itself.

The operation was successful, and the condition of the patient improved rapidly. The fistula allowed regular passage of stools mixed with barium. The patient was given 15 Gm. of castor oil daily and the fistula was irrigated with olive oil; gradual dilatation of the anus was continued. The abdominal distention soon diminished.

Before attempting a complementary ganglionectomy we gave spinal anesthesia, and performed a left lumbar sympathectomy on the first, second and third ganglia. Defecation via the fistula as well as via the anus was completely satisfactory. After five months, the patient had gained 8 Kg. in weight. The toxic condition disappeared. The child's appetite was good. At his family's request he was discharged from the hospital.

Six months later when he returned, his general condition showing much improvement. Defecation via the anus still occurred, although a certain obstipation was still present. The abdomen was still distended, but less so than when he was first admitted. A new roentgen study with a contrast medium revealed megacolon filling the abdomen. We decided to perform a colectomy. About a month later, a median subumbilical laparotomy was made with the boy under lumbar anesthesia. A sigmoidal segment, measuring 25 cm. in transverse diameter and extending from the diaphragm to the pelvis (the classic S form was entirely lost) and occupying the whole right lateral part of the abdomen was removed, then a terminolateral anastomosis of the cut extremities was performed in the usual manner. The resected segment contained 7 Kg. feces.

The patient left the hospital June 30, 1947, completely recovered. At that time he measured 1.32 m. and his weight was 13 Kg.

Case 2. A. C., a boy [illegible] was admitt service on Dec. 18, 1947, with a diagnosis of Hirschsprung's disease. The principal symptoms were distention of the abdomen, obstipation and anorrhexia. Advanced cachexia was also observed. According to his parents, the child had been obstipated since his birth, having only one defecation a week, and his stools were dry and hard. With his increase in height, his abdomen had become more and more distended. Of late he had lost his appetite, and his general condition was poor.

Clinical Examination: The child was very thin; his height was 1.08 m. and he weighed 14 Kg. He was dehydrated. The muscular tonus was greatly diminished. He was so exhausted that he could not stand. Laboratory examination revealed anemia (red blood cells, 3,080,000; Hgb. 50 percent). The circulatory and respiratory systems were normal.

Digestive System: The abdomen was hard and distended. On the abdominal walls, especially on the left side, intestinal peristalsis was perceptible. The absolute dullness of the liver began in the fifth intercostal space and did not extend beyond the costal margin. The spleen was palpable. On rectal examination the anus and rectum were open.

Roentgen Examination: The roentgenologic diagnosis was megacolon.

Operation: Because of the child's age and his bad condition, we decided to perform a two stage operation. On Dec. 19, 1947, with the patient under ether narcosis, we undertook a laparotomy with the intention of establishing a stercoral fistula, as my former experience had yielded good results. On opening the abdomen we observed a distended sigmoidal segment 25 cm. in diameter, with hyperplastic walls. It was impossible to displace this segment. We therefore established in it an anus praeternaturalis.

The postoperative course was uneventful. The patient had copious stools via the fistula; his general condition improved rapidly; the intoxication and adynamia disappeared and he gained 7 Kg. He was soon in a condition to permit the colectomy.

On Feb. 2, 1948, using ether narcosis, we performed a median subumbilical laparotomy with excision of the fistula. The diameter of this megacolon, which measured 45 cm. in length, had diminished from 25 to 15 cm., and the hyperplastic condition of its walls was much improved. The colon was easily displaced and, after being taken out of the abdominal cavity it was resected to a length of 45 cm. An end-to-end anastomosis of the cut surfaces was performed.

At the time of writing the child is well. His weight is 22 Kg. occlusion or actual occlusion, the establishment of a stercoral fistula is accepted and has been practised for a long time. The fistula however, is made either in the cecum or in the colon ascendens, not in the diseased segment, with resection done in a second stage. As far as we know the medical literature up to this time contains no mention of a case in which a temporary colostomy was made on the diseased segment. I myself had always followed the classic method before, but in these two cases here reported the establishment of a provisory fistula on a diseased segment of colon resulted in rapid improvement of the patient's general condition and also provided better conditions for radical colectomy, which has yielded excellent results. I therefore feel justified in recommending this new technic in cases of congenital megacolon.

SUMMARY

Two cases of Hirschsprung's disease are reported in which an artificial anus (temporary) was successfully created on a segment of the megacolon itself, to be followed later by a suitable colectomy that included the surgical fistula. Results in both cases were eminently satisfactory. It is suggested that this procedure has certain advantages, especially as regards its ease of performance, over the accepted methods of surgical treatment of this condition.

Streptomycin in the Surgical Therapy of Pulmonary Tuberculosis*

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IT is befitting on this occasion to commemorate the courage and wisdom of Carlo Forlanini, of Pavia, Italy, who in 1888 treated a person with unilateral phthisis by injecting air into the chest, later he carried out the same treatment on two other patients in 1894 and 1895 Forlanini followed the recommended concepts of Pierre Carl Edouard Potain, a French physician of Charite hospital, Paris in believing that collapse of the lung by air was beneficial in pulmonary tuberculosis as it immobilized the lung J B Murphy, an eminent American surgeon, gave a detailed account of his experiences with artificial pneumothorax before the American Medical Association in 1898 Professor Ludolf Brauer of Germany carried on the work of these pioneers, and within a few years the value of artificial pneumothorax had been clearly demonstrated and its use spread throughout the civilized world

From this beginning other well established collapse therapy measures have been developed for producing rest for the involved tuberculous lung, such as extrapleural thoracoplasty, paralysis of the hemidiaphragm, etc To this indirect approach has intermittently been added the practice of excision of the diseased portions or even all of one lung In the aggregate these procedures plus the all important factor of physical and mental rest, have constituted our advances in the treatment of pulmonary tuberculosis Thus from the relatively simple principle of utilizing the freest of all elements, namely air, to produce rest for the diseased lung we now approach an era of utilizing the products of the earth to interfere with the growth of tubercle bacilli in the human lung and to aid in the resolution of lesions due to the seemingly ceaseless efforts of this often insidious enemy of man From the soil, Wakeman and his co workers in 1943 isolated and reported the discovery of streptomycin, produced by actinomyces griseaus

Streptomycin has been found to be very active against the tubercle bacillus in the test tube and of such low toxicity as to be well tolerated by animals and man The effects of streptomycin on tuberculosis in guinea pigs is often dramatic Many animals that have extensive disease are apparently cured as evidenced by (1) normal appearing organs by gross inspection, (2) the absence of microscopic evidence of tuberculosis, (3) negative results on subinoculation of tissue from these treated pigs"

The mode of action of streptomycin is unknown The manner in which it may affect the metabolic or reproductive functions of the tubercle bacillus is undetermined Extensive animal experimentation has already been carried out, and much more remains to be learned from further animal studies The clinical application of this antibiotic and the interpretation of its results in the treatment of pulmonary tuberculosis is a very timely subject Streptomycin is now being produced in adequate quantity and is being used for a rapidly increasing number of patients All workers, experimental and clinical, are hopeful that a more effective agent will be available in the near future

It is the purpose of this paper to relate the experience of Fitzsimons General hospital, U. S Army, in the use of streptomycin in the surgical phases of the management of pulmonary tuberculosis This hospital has a daily census of about 1,000 patients suffering from pulmonary and/or extrapulmonary tuberculosis Approximately 850 patients have received streptomycin as a part of the medical and surgical management of their disease The surgical procedures exclusive of extrapleural thoracoplasty and lobectomy or pneu[illegible]

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*From the Surgical Service Fitzsimons General Hospital U S Army Denver (8) Colo

Published under the auspices of The Surgeon General U S Army who does not necessarily assume responsibility for the professional opinions expressed by the author tomy employed in the treatment of pulmonary tuberculosis, will not be discussed in this paper.

EXTRAPLEURAL THORACOPLASTY FOR PARENCHYMAL DISEASE

With the advent of adequate quantities of streptomycin there has evolved in our hospital a rather definite plan of approach to the utilization of surgery in pulmonary tuberculosis, which differs somewhat from that followed prior to the use of streptomycin. Since 1924 surgery, and in particular extrapleural thoracoplasty, has occupied an important place in the management of pulmonary tuberculosis at Fitzsimons General hospital.

Today the use of streptomycin is an adjunct to therapy, with the following general indications for its use:

1. Streptomycin is used as a definitive measure for patients in whom a reasonable hope exists that arrest of the disease may result without resort to collapse or other surgical procedures. In this group collapse therapy measures are added promptly if encouraging results are not readily apparent. It is not used at the present time in the treatment of minimal disease.

2. It is used as a preparatory measure for either improving the operability of the patient or aiding in the conversion of an unsuitable operative risk in need of surgery to a reasonable surgical risk.

In the former instance a relatively short period of streptomycin therapy has been found satisfactory. In this group of patients the drug is employed with a view of reducing toxemia, decreasing cough and sputum production, lowering the sedimentation rate, and for its almost specific action of improving endobronchial tuberculosis. A four week period of preoperative therapy of one Gr. of streptomycin daily has been employed during the past several months with very pleasing results. In the latter group are encountered those patients with recent moderate to extensive lesions of an exudative nature.

Prior to streptomycin the sporadic efforts made to attack this problem surgically have failed. Our clinical experience to date is insufficient to indicate that any effective alteration of previous concepts is in order. However, we are encouraged by our results to continue on the following plan.

Streptomycin favorably influences the trend of resolution in these exudative types of lesions. Often this trend is definitely demonstrable within a 60-day period of therapy, and thoracoplasty is then rendered feasible.[3] However, we have not hesitated to employ three or four months or a longer period of streptomycin therapy in preparation for thoracoplasty in certain cases. It is in these types of lesions that the exudative element may resolve, leaving areas of excavation. We believe such cavitary processes should be operated upon early to avoid the production of the inevitable hard, destructive fibrous lesions in which the anatomic and pathologic changes deter healing and result in prolonged chronicity, subjecting the patient to the constant dangers of disease progression, hemorrhage and contralateral or ipsilateral spread of the disease.

3. Those patients whom we have considered "good risks" for thoracoplasty have had streptomycin employed prophylactically. A short period of preoperative therapy, one to two weeks, continuing the drug in one Gr. daily dose during the six or seven weeks of thoracoplasty procedures, and one to two weeks postoperatively, is our present policy. The rationale of this is to aid in the prevention of spread of the disease during the period of surgery. This has been particularly desirable in those "good chronics" with large cavities who expectorate considerable quantities of sputum. In these cases, spread of the disease during the period of surgery has been a constant deterrent to all thoracic surgeons. With the era of streptomycin it is believed that the dangers of spread have been definitely lessened.

4. Symptomatic relief obtained from tuberculous laryngitis, cystitis, and similar complications in far advanced pulmonary tuberculosis is often noted under streptomycin therapy. In such instances streptomycin is used for as short a period as possible to obtain relief of the distressing symptoms. This plan of approach to therapy in pulmonary tuberculosis. as emphasized by Tempel, requires extensive use of streptomycin, defines its indications, and increases the frequency with which surgery, such as extrapleural thoracoplasty and

pulmonary resection, may be applicable at a relatively early date in course of the patient's disease[4]

Up to April 1948, 78 patients suffering from pulmonary tuberculosis in whom extrapleural thoracoplasty was employed have been treated with streptomycin before, during, and after surgery This group does not include patients treated by extrapleural thoracoplasty because of a tuberculous or mixed empyema A brief presentation of certain data relative to the age of the patient, dosage of streptomycin, the duration of such therapy, and the estimated duration of the disease prior to surgery follows Of the 78 patients, 54 were white and 24 were negroes, the ages varying from 19 to 54 Fifteen were between 19 and 21, 34 between 22 and 30, 17 between 31 and 40, 10 between 41 and 50, and two over 50 years of age

The dosage of streptomycin has varied considerably Forty eight patients received a daily dosage of two Gm (two million "S" units) in divided doses injected intramuscularly every four hours—day and night Twenty six received a daily dose of one Gr administered in two equal doses Four patients received more than two Gm per day The total dosage has also varied In only seven of the patients was the total dosage less than 100 Gm Thirty received 101 to 200 Gm , 22 were given 201 to 300 Gm , and 19 received more than 300 Gm The total duration of the therapy has also varied Forty patients in our series received streptomycin for more than four months Seven patients received streptomycin for one to two months, and no patient in this study received the drug for less than one month

In the employment of streptomycin in the surgical management of pulmonary tuberculosis, two factors have been found most important first, the type of pulmonary disease present and second, *the capacity of the* human tubercle bacillus to become resistant to the effects of streptomycin It appears to be the consensus of almost all workers in clinical tuberculosis who have employed streptomycin on a fairly large scale that this particular drug is most effective in aiding in the resolution of the exudative types of lesions It also seems to be the opinion that the maximum improvement resulting from streptomycin occurs about the 60th to the 90th day of therapy It is also at about this period that resistance develops in a high percentage of patients receiving one Gm daily of streptomycin For these reasons we have gradually utilized streptomycin as a preparatory measure for surgery in cases which, prior to the advent of streptomycin, would not have been considered at such an early period in their disease for thoracoplasty or pulmonary resection

Many of our patients have been young soldiers and have had recent moderate exudative lesions In 32 of our 78 patients the known duration of pulmonary tuberculosis was less than 12 months before thoracoplasty was accomplished Other patients having extensive exudative lesions have had streptomycin instituted without the belief that thoracoplasty would be feasible It is in this group of patients that we have been particularly surprised to find, often, after a period of two to *four months of streptomycin, that they have* been converted to suitable candidates for *thoracoplasty In* this series of 78 patients, 18 or 22 percent fell within this group Thirty-six or 46 percent were what we considered as "good chronics" and would have been subjected to thoracoplasty with or without streptomycin therapy It is therefore evident that practically all patients treated for parenchymal disease, in whom thoracoplasty has been utilized during the past 18 months, have received streptomycin therapy

The factor of the development of resistance by the human tubercle bacillus to effects of streptomycin was not thoroughly recognized and appreciated in the earlier months of our experience In vitro, at least, streptomycin does not inhibit the growth of resistant tubercle bacilli, and little or no benefit would be expected from the administration of this drug to individuals expectorating streptomycin re*sistant tubercle bacilli* Sufficient evidence has now accumulated to indicate that development of resistance should be expected in practically all patients who have received one Gr daily of the drug for a period of approximately three or more months For these reasons we have recently been using streptomycin for shorter periods of time preoperatively and contemplate a still shorter period of postoperative use of streptomycin Comparable results may or may not be obtained [illegible] decrease the period of time which streptomycin is used in connection with surgical procedures.

Clinical results obtained from the use of streptomycin after prolonged periods of therapy, that is three or four months, are difficult of interpretation in the presence of a satisfactory thoracoplasty. Our impression, in general, is that clinical improvement usually continues. In fact, there have been five patients studied by our laboratory who expectorated tubercle bacilli which at first were sensitive to streptomycin and later became resistant to the drug. After three or four months of continuous therapy these organisms again became sensitive to streptomycin. Three of these patients had been treated by thoracoplasty; two had no collapse therapy. This finding may offer a partial explanation for the sustained clinical improvement despite the expectoration of streptomycin resistant tubercle bacilli. Further work is now in progress on this point.

The duration of the pulmonary disease prior to thoracoplasty could not be accurately determined. Approximately 85 percent of the patients in this group were military personnel and the initial symptoms usually resulted in chest roentgenograms being made. Therefore, the duration of the disease in an estimated 75 percent closely paralleled the time a positive diagnosis was made. Thirty-two or 41 percent of the patients had had a positive diagnosis 12 months or less prior to thoracoplasty. Twenty-eight or 35 percent had had a diagnosis more than two years before thoracoplasty was accomplished. It is our belief that this group, as a whole, does vary somewhat in respect to the duration of the disease from that generally selected for thoracoplasty. Prior to analyzing our data we had gained the impression that we were operating upon patients in whom the disease had been of a relatively short duration. This percentage has, in fact, been appreciable. With our experience we are not at this time willing to recommend that streptomycin permits disregarding the long-established requirements of evidence of good resistance on the part of the patient to his disease as a criterion for the selection of thoracoplasty candidates.

The selection of patients for thoracoplasty has long been characterized by certain variations of opinion even among the most experienced. Likewise, certain principles in case selection have long been established, in particular evidence of resistance, as noted by predominance of fibrosis on the roentgenogram, and minimal clinical evidence of toxicity.

In the group of patients reported on, we have endeavored to select them on the basis of established principles, reserving an open mind as to the use of streptomycin in preparing an unsuitable risk for surgery within a relatively short period, i. e., a few months. On this basis 45 percent of our patients would have been considered by us as "good chronics" and suitable for thoracoplasty prior to the advent of streptomycin. Of the remaining 42 patients, we believe 22 were given the benefits of thoracoplasty at the particular time they were operated upon because streptomycin aided in the resolution of exudative lesions and was available to offer a degree of protection, against spread of the disease. That this distinction in the selection of patients and timing of the operation is open to debate is readily appreciated. This leaves 18 patients of the total 78 who, we feel, were entirely unsuitable for a thoracoplasty and were surprisingly converted by streptomycin therapy from unsuitable to satisfactory thoracoplasty risks. The remaining two patients had streptomycin for other reasons or there was a long period between the time it was first given and the time it was restarted prior to the thoracoplasty.

In all patients cavitary lesions were present at the time of thoracoplasty. In 22 or 28 percent of the patients a single cavity measuring more than 5 cm. in its smallest diameter on A. P. roentgenogram was present. Bronchoscopy was not routinely performed preoperatively, thus the frequency of endobronchial tuberculosis is not known.

In evaluating the use of streptomycin in this group of patients the following factual data is presented: Two hundred and thirty-two operations were performed on 78 patients. Spread of the disease occurred in only one patient. This spread rapidly resolved, and the contemplated stages of operation continued uninterrupted. One death occurred three days after the third stage of operation, in a patient considered as a good risk whether or not streptomycin was used. No definite cause for his death could be ascertained on postmortem examination One patient, aged 54, died two and one-half months after the third stage of operation The closure of a giant cavity, present before operation was confirmed at autopsy Streptomycin played no part in the death of either patient

The series presented is too small and the time which has elapsed since surgery is too short to permit final evaluation In a group of 48 of these patients of whom a six months' postoperative study was made, the results were as follows Forty of the patients could be followed Two deaths (as noted above) occurred, seven had had one or more positive sputum examinations and/or probable residual cavitation beneath the thoracoplasty Thirty one had repeatedly negative sputum and no evidence of residual cavitation beneath the thoracoplasty With 1 Gr dosage there were no noteworthy complications considered to be due to streptomycin

CASE REPORTS

Case 1 This patient was a 25 year old soldier who was well until April 1947, when he had an acute onset of fever, chills, cough, night sweats, and malaise A roentgenogram of the chest revealed an exudative infiltration throughout the left lung with cavitation of the left upper lobe, and the sputum was positive for acid-fast bacilli He was admitted to Fitzsimons General hospital, Denver, June 22, 1947, at which time he was toxic, with daily temperature 100-101° F, and expectoration ¼ cupful of sputum daily (Fig 1)

On July 7, 1947 he was started on streptomycin, two Gm daily After four months of such therapy there had been rather marked resolution of the exudative element as noted on roentgenograms, temperature was normal, and sputum production had decreased to 10 cc per day (Fig 2) On November 19 he was started on a second course of streptomycin prior to thoracoplasty Between Nov. 24, 1947 and Jan 26, 1948, a four stage eight-rib thoracoplasty had been performed Streptomycin was discontinued after 228 days of therapy and a total dosage of 456 Gm Postoperative course after each operation was uneventful and in April 1948 the sputum was negative with no evidence of cavitation noted on x-ray examination (Fig 3) From the time of onset of illness to completion of thoracoplasty, nine months had elapsed

Case 2 This 19 year-old Negro was admitted to Fitzsimons General hospital, Denver, Sept. 17, 1947 as a transfer from Japan (Fig 4) He was apparently well until June 1947, when he developed an aching pain in his left chest and was admitted to the hospital July 28, 1947 A diagnosis of pneumonia was made, but when symptoms and findings failed to subside, sputum was found to be positive for tubercle bacillus On admission to our hospital, x ray of chest showed infiltration throughout the left upper lobe with areas of radiolucency representing early cavitation There was also a slight spread in the right lung field Streptomycin was started September 21, two Gm every other day, and his clinical symptoms rapidly declined Sputum decreased from ½ to ¼ cupful in 24 hours He began to gain weight and his temperature dropped from 100° F to normal

In December 1947 thoracoplasty left was recommended (Fig 5) On January 8 a first stage thoracoplasty was performed, with removal of the first two and one half ribs Postoperative course

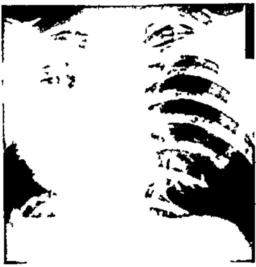

Fig 1 Extensive involvement, left *(Case 1)*

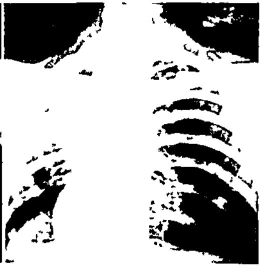

Fig 2 Clearing of lesions with streptomycin *(Case 1).*

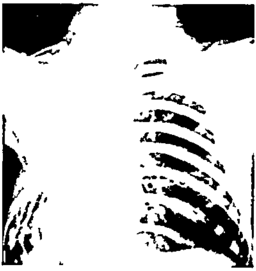

Fig 3 Postoperative, four months ([illegible])

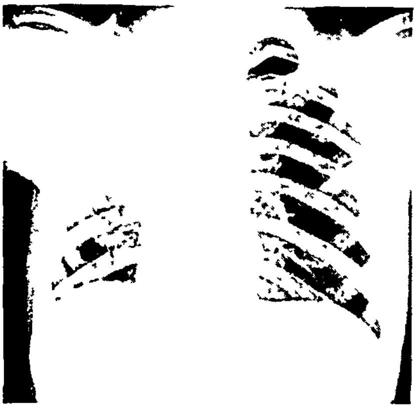

Fig. 4. Extensive involvement, left *(Case 2)*.

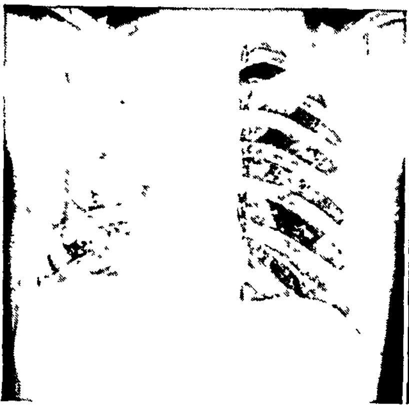

Fig. 5. Clearing with streptomycin *(Case 2)*.

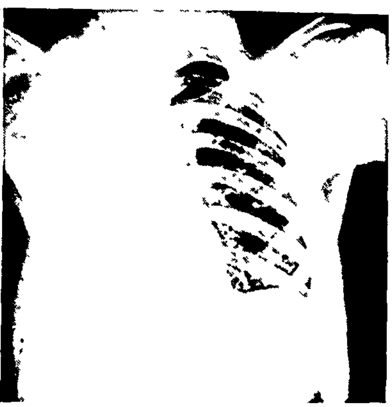

Fig. 6. Postoperative, three months *(Case 2)*.

was uneventful. On January 29 a second stage operation was performed. The postoperative course was moderately febrile, and an x-ray of the chest was taken one week following surgery and showed evidence of a slight spread in the lower lobe on the left. Streptomycin was continued, and after two weeks the temperature returned to normal and the chest roentgenogram showed a regression of the spread in the left lower lobe.

On Feb. 17, 1948, the third stage was performed, with removal of posterolateral segments of the sixth, seventh and eighth ribs. There appears to be an adequate collapse of the diseased left lung. The patient was taken off streptomycin March 20 and has been afebrile since his last stage thoracoplasty (Fig. 6). X-ray shows what appears to be adequate collapse of the diseased left lung and the right lung has remained stable. The time of onset of illness to completion of thoracoplasty was seven months.

Case 3: This patient was a 29-year-old Negro soldier who was hospitalized May 15, 1947 because of fever (102° F.) and a mildly productive cough. He was transferred to Fitzsimons General hospital May 31, 1947, at which time his sputum was positive for tubercle bacilli (Fig. 7) and the Kahn reaction was positive. Chest roentgenogram revealed an exudative infiltration throughout right lung with large (6 cm.) and smaller cavitation in the right upper lobe and evidence of an extension in the left lower and the right lower lung fields. Streptomycin, 2 Gm. daily, was given from June 13 to October 14. In November a tuberculous laryngitis and an ulcerative endobronchial tuberculosis of the right upper lobe orifice was diagnosed.

In November he was afebrile, sedimentation rate was 25/60, the exudative infiltration bilaterally had cleared considerably but the upper lobe cavity on the right remained. On Dec. 4, 1947 streptomycin therapy, 1 Gm. daily was again started (Fig 8). A seven rib thoracoplasty right was carried

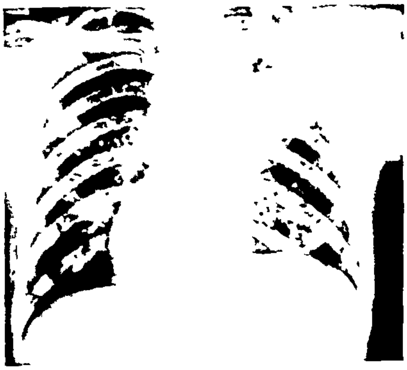

Fig. 7. Extensive involvement, right. Bronchogenic spread, left *(Case 3)*.

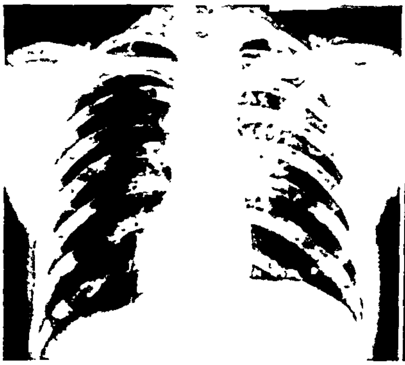

Fig. 8. Considerable clearing with streptomycin *(Case 3)*.

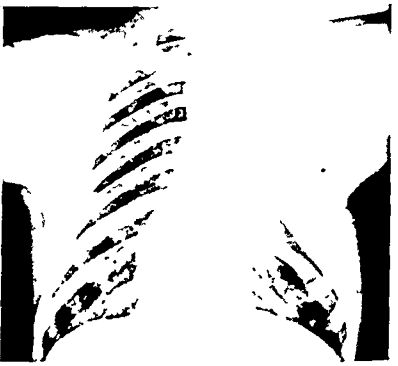

Fig. 9. Postoperative, three months *(Case 3)*.

out between Dec 18, 1947 and Jan 30, 1948 Streptomycin was discontinued March 5, 1948 after he had received 332 Gm over a period of 209 days (Fig 9) His sputum production is now nil and negative on smear and culture X ray examination of the chest does not reveal evidence of cavitation Within eight months from time of onset of illness thoracoplasty had been completed

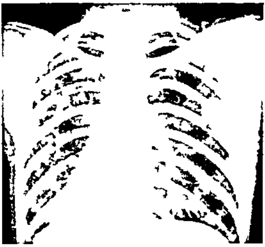

Fig 10 Giant cavitation left upper lobe Bronchogenic spread right *(Case 4)*

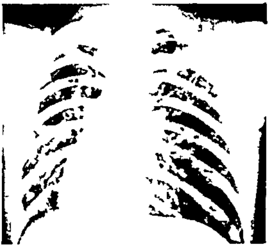

Fig 11 No streptomycin *(Case 4)*

Case 4 A 31 year old white male soldier developed pulmonary tuberculosis which was detected by positive sputum and x ray evidence of the disease in June 1945 and he was admitted to Fitzsimons General hospital June 21, 1945 (Fig 10) At this time he was toxic temperature 100 101° F, dyspneic, and had a giant cavity in left upper lobe with evidence of a bronchogenic spread in the right upper lobe Pneumoperitoneum carried out from Aug 14, 1945 to November 1946 His course continued as one of retrogression In April 1947 2 Gm daily of streptomycin was started and an artificial pneumothorax right, was established Improvement was gradual and in September he was still sensitive to streptomycin (Figs 11, 12)

In October 1947 a left thoracoplasty was started and was completed in December Pneumothorax on his right was continued during surgery Streptomycin was discontinued January 14 He received a total dosage of 302 Gm of streptomycin Sputum was negative in February and there was no evidence of cavity on x ray examination (Fig 13)

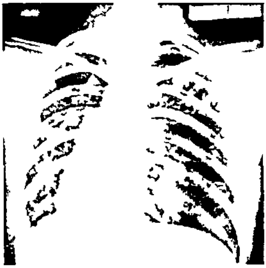

Fig 12 Considerable clearing after streptomycin *(Case 4)*

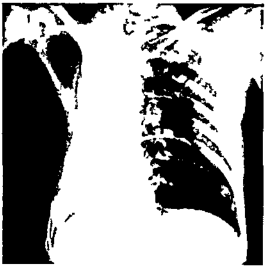

Fig 13 Postoperative, one month *(Case 4)*

Case 5 The patient had tuberculosis in 1943 and was hospitalized for two months (Fig 14) He remained out of a hospital for the following year He was again admitted to Fitzsimons General hos

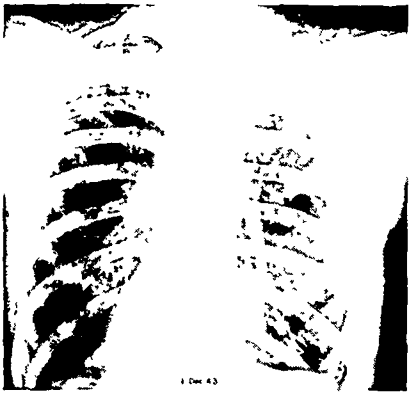

Fig. 14. *(Case 5.)*

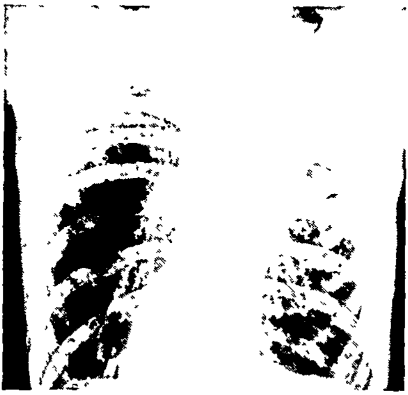

Fig. 15. Giant cavity, right. Smaller cavitation, left *(Case 5)*.

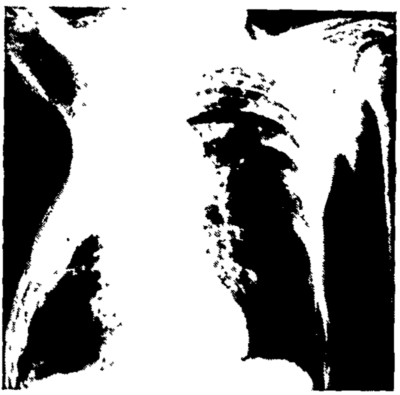

Fig. 16. Postoperative *(Case 5)*.

pital on Nov. 9, 1946. Chest x-ray revealed a 2½ cm. cavity in the left apex and mottled heavy infiltration involving upper lobe, left lung. In the right lung a giant cavity measuring six by eight cm. in diameter and a smaller cavity directly beneath the giant cavity was present (Fig. 15). All lobes of the right lung field were also infiltrated with a heavy mottled infiltration. The left epididymis was enlarged four to five times and there was a draining sinus on the lateral aspect of the right scrotum. There was also a deep ulceration in the midline two cm. posterior to the anus with a typical fistula tract exuding yellow-green pus. X-ray of the chest on April 16, 1947, revealed an increase in size of the right upper lung cavity. The sedimentation rate was 20/60. It was recommended that the patient should have a right thoracoplasty following a course of streptomycin. He was started on streptomycin on July 3, 1947, two Gm. daily. Although the outlook was unfavorable at this time, it was believed that the benefits of thoracoplasty should be offered the patient.

On July 24, 1947, a first stage thoracoplasty on the right was performed under pentothal sodium, two and one-half percent intravenously and novocaine one percent locally. The patient's postoperative condition was good. On Aug. 14, 1947, second stage thoracoplasty was performed and on Sept. 3, 1947 the third stage thoracoplasty was performed. The postoperative condition was satisfactory. Following the third thoracoplasty the patient remained extremely dyspneic and required continuous nasal oxygen. By November 10 the patient's general condition had deteriorated rapidly. He died Nov. 26, 1947. Postmortem examination failed to reveal evidence of the giant right cavity (Figs. 16, 17).

Case 6: This patient was well until June 1944, when he began to have symptoms of fatigue and cough. An x-ray of the chest taken that September suggested tuberculous disease and his sputum was positive. A left pneumothorax was attempted but was unsuccessful; a right pneumothorax was then attempted which was successful. This was maintained until July 1945, when dyspnea and rapid progression of his disease on the contralateral side resulted in abandonment of the right pneumothorax.

The patient was admitted to Fitzsimons General hospital February 1947 (Fig. 18). On admission, chest x-ray films revealed involvement of all lobes both lungs with cavitation left upper lobe. The sedimentation rate was 18/60 and his temperature ranged between 100-101° F. In early March he showed evidence of tuberculous enteritis manifested by frequent watery stools. He also developed signs of meningitis associated with paresthesia of both lower extremities and urinary retention. He was immediately placed on intrathecal streptomycin (0.2 Gm.) and three Gm. intramuscularly daily and 0.5 Gm. orally every hour. His gastrointestinal and meningeal signs improved dramatically by March 17. Spinal fluid during the acute meningitis revealed elevated pressures, elevated total protein and 60 cells per HPF, mostly polys. The Tryptophane and Levinsone tests were positive; smear and culture for AFB were *not* positive. The exudative element of his pulmonary disease cleared on continued streptomycin but the cavity in his left apex remained patent.

In July 1947 he finished a four months' course of streptomycin (Fig. 19). On September 11 he was restarted on the drug in preparation for surgery and between September 11 and October 23, three stages of thoracoplasty were performed. Postoperative x-rays showed no spread of his disease, his sedimentation rate was 2/60 in November 1947 and he was afebrile from the third

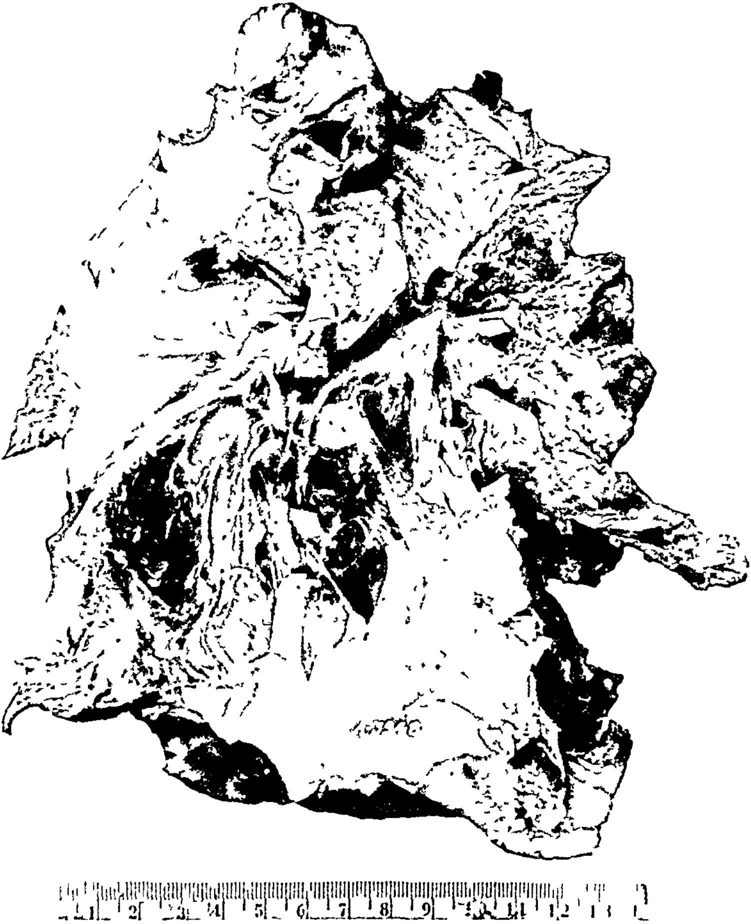

Fig 17 Postmortem specimen, right lung, no cavity *(Case 5)*.

postoperative day following his last stage on. Streptomycin was discontinued on November 28 after having received 857 Gm. of the drug. Sputum negative and x-ray film of chest in January 1948 negative for cavity. His general improvement has continued (Fig. 20).

TUBERCULOUS AND MIXED INFECTION EMPYEMA

The surgical management of tuberculous and mixed infection, i.e., tubercle bacilli plus pyrogenic organisms, has been relatively static for the past 15 years. The results of therapy have at best left much to be desired, and despite attempts at varied forms of therapy such as oleothorax and intrapleural catheter suction drainage, the sheet anchor of therapy has been the obliteration of the empyema space by thoracoplasty. Our experience in the use of streptomycin in this condition has been limited entirely to its employment along with surgery in 16 patients. In each instance the pleural fluid was of a specific gravity of 1.018 or more and was positive on culture for acid-fast bacilli. The patients varied in age from 19 to 56 years. In all instances there was evidence of parenchymal disease. Eight patients had a pure tuberculous empyema and eight had a mixed infection empyema. The duration of the empyema varied greatly. In one the onset was in 1939, one in 1944, three in 1945, five in 1946, and six in 1947. The precipitating cause of the empyema was attributed to a spontaneous pneumothorax in nine instances, a massive pleural effusion in three, one each secondary to thoracoplasty and lobectomy, in two no particular contributing cause could be determined.

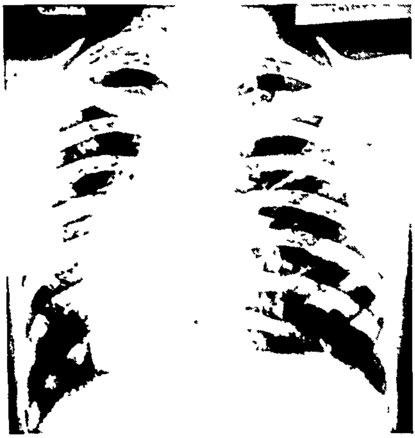

Fig. 18. Giant cavity, left *(Case 6)*.

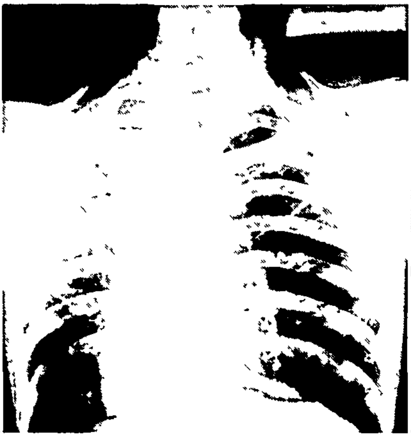

Fig. 19. Slight clearing with streptomycin *(Case 6)*.

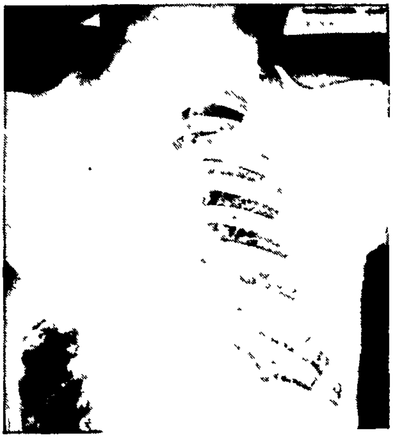

Fig. 20. Postoperative, three months *(Case 6)*.

The value of streptomycin in the treatment of tuberculous or mixed infection empyema is most difficult to assess. The prolonged nature of the disease and associated complications, together with the underlying parenchymal involvement serving as a constant focus for fluid production, have long been recognized as factors producing a poor prognosis. Our plan and rationale in the use of streptomycin in the surgical phases of tuberculous and mixed infection empyema is as follows: Streptomycin probably has little effect on the parenchymal disease which is usually of a proliferative nature by the time surgery is accomplished. However, streptomycin is used as a prophylactic measure in these cases similar to those with the same type of disease without empyema who are treated by thoracoplasty. Streptomycin locally, i.e., intrapleurally is employed for its effect on inhibiting the growth of tubercle bacilli. Penicillin and sulfa drugs are also injected intrapleurally in the treatment of mixed infection empyema.

No conclusions are warranted from our limited experience with streptomycin in the treatment of tuberculous empyema. The following factual data referrable to this experience is, however, presented. Two patients in this group died during the active phase of their surgical therapy, one of tuberculous meningitis, the other following a first stage thoracoplasty Treatment has been completed in 13 or was interrupted by the death of the patient and three are still under active surgical treatment Thoracoplasty in multiple stages with or without open drainage and muscle plasty was carried out in 12 patients Of this number one is dead and in 10 the empyema space has been obliterated In only one instance was closed tube drainage alone employed

Case 7 A 22 year old white soldier was admitted to Fitzsimons General hospital March 8, 1947 He was apparently well until Nov 13, 1946, at which time he had severe chest pain and fever 101° F After five days of hospitalization he had apparently recovered and returned to duty On Feb 25 1947 he had a moderate hemoptysis Chest roentgenogram was suggestive of tuberculous disease and sputum examination revealed tubercle bacilli On March 9, 1947 he developed a spontaneous pneumothorax, right Parenchymal infiltration was present bilaterally with areas of cavitation His condition was immediately critical and closed intercostal tube drainage was established On March 15 streptomycin therapy was started, his lung reexpanded except for moderate sized lateral pocket but his condition remained poor for several weeks The pleural fluid was positive on culture for tubercle bacilli but negative for pyogenic organisms The intercostal tube was removed and the pleural fluid aspirated at two to three day intervals, the amount removed varying from 30 to 150 cc

Beginning May 3, 1947 intrapleural instillation of 1 Gm streptomycin 100 000 units of penicillin and 1 Gm of sulfadiazine was carried out at two to three day intervals He began to improve slowly with concomitant improvement in the tuberculous involvement in both lungs Sputum became negative in June 1947 and has remained negative Streptomycin was discontinued Oct 20 1947, after having received a total of 472 Gm of the drug intramuscularly during the period of March 14 to Oct 28, 1947 In April 1948 he was still hospitalized raising one teaspoonful of sputum in 24 hours and x ray of chest reveals considerable proliferative infiltration in both lung fields This is the only case treated by closed tube drainage alone

Case 8 A 32 year old white male had sudden onset of acute severe pain, left chest and dyspnea in May 1946 X ray examination of the chest revealed a spontaneous pneumothorax on left Fluid developed which was positive for tubercle bacilli and multiple small cavities were noted in the partially reexpanded left upper lobe He was admitted to Fitzsimons General hospital Aug 8, 1946 Physical examination disclosed an emaciated young adult, producing ½ cupful of sputum, marked shift of trachea to right limitation of motion left chest and absence of breath sounds over area, WBC 18 500 A6 94 percent sputum positive for tubercle bacilli X ray examination of the chest revealed parenchymal cavity left upper lobe with almost complete collapse of lung with fluid level to sixth rib posteriorly A bronchopleural fistula was present and the aspirated fluid soon became frank pus

Surgical therapy consisted of repeated aspiration of fluid instillation of penicillin and a two stage thoracoplasty carried out between the period of Jan 25 1947 to the latter part of February Purulent fluid in small quantities continued to be aspirated and multiple cutaneous sinus tracts developed On July 27 open drainage of empyema was established and 2 Gm daily of streptomycin was started The latter treatment was continued for four months Rather marked clearing of the fluid resulted Further multiple stage thoracoplasty and unroofing of empyema with muscle plasty closure had been completed by Sept 15, 1947 March 22, 1948 a reevaluation note stated that empyema activity has remained obliterated, no sputum, and no draining sinus

STREPTOMYCIN IN PULMONARY LOBECTOMY OR PNEUMONECTOMY IN THE TREATMENT OF PULMONARY TUBERCULOSIS

No phase of the surgical management of pulmonary tuberculosis has aroused greater interest than has pulmonary resection As early as 1881 Block unsuccessfully resected the apex of both lungs in one operation in a patient believed to have tuberculosis Tuffier in 1891 resected the apex of a tuberculous lung in a 22 year old male who made a successful recovery During the decade of 1930 to 1940, successful case reports of lobectomy and pneumonectomy for tuberculosis were reported by Beye,[6] Graham [7] Freedlander,[8] Bruun and Shipman [9] James [10] Dolley and Jones [11] and others From 1940 to 1946 several rather large series were reported by Sweet,[12] Overholt,[13] Streiter [14] and others

The paper which Sweet presented at the meeting of the American Association for Thoracic Surgery in 1946 summarized the consensus of most thoracic surgeons on this subject prior to the advent of streptomycin [12]

He reemphasized the thoroughly recognized fact that "pulmonary tuberculosis does not lend itself to surgical extirpation in the sense that the entire diseased area can be removed. At best the surgeon can expect merely to eradicate the largest or most active focus of infection, but the patient's immunologic forces must be sufficient to overcome and hold in check the remainder."[12] He also emphasized the necessity of carefully reviewing chest roentgenograms made early in the patient's illness to aid in evaluating the usually noted evidence of bilateral dissemination of the disease. It was the reactivation of these foci which were frequently responsible for the so-called "postoperative spread of the disease." Of the 27 patients subjected to lobectomy 7, or 25.9 percent, died either early or late following lobectomy, while 14 of 36 patients (39 percent) subjected to pneumonectomy died either early or late.

In discussing Sweet's paper, Strieder made the following statement in reference to his experience concerning the spread of the disease following lobectomy and pneumonectomy: "Spreads early and late, which again are the significant figures, rather than the early ones occurring within 60 days are as follows: of the lobectomies, 60 percent had either spreads or reactivation of the disease, and of the pneumonectomies, 45 percent had either spreads or reactivation."[14] He reported the late mortality as 10 percent for lobectomy and 23 percent for pneumonectomies. Sweet concluded that, "because pulmonary tuberculosis is not primarily a surgical disease, the hope for future progress in its management and cure lies in the possibility that some medicament may be developed which will overcome the invading organism and thus prevent the development of the well known manifestations of the disease by eliminating their source." [12]

This desired development has not as yet been achieved, but we are now in the process of determining whether or not streptomycin will furnish, in part at least, the medicament which will permit the performance of pulmonary resection in tuberculosis with a marked reduction in the incidence of spreads or reactivation of the disease in the remaining lung tissue. I know of no experience which today permits that evaluation. Murphy, reporting from the Veterans Administration hospital, Oteen, N. C., gave a very low incidence of spreads and reactivation in some 60 patients treated by either lobectomy or pneumonectomy who also received streptomycin therapy.

At Fitzsimons General hospital, approximately 135 patients have been treated by lobectomy or pneumonectomy for pulmonary tuberculosis during the past five years. The results prior to the streptomycin era are being studied and seem to be similar to those reported by Sweet. During the past 18 months we have discontinued the earlier practice of performing lobectomy or pneumonectomy in cases which we believe are suitable for thoracoplasty and relatively few pulmonary resections have been performed for tuberculosis.

We are in agreement with O'Brien, who in 1946 stated, "We believe that resection has an important place in the treatment of pulmonary tuberculosis. We do not believe however, that it should be used where other procedures have a good chance to control the disease."[15] The two groups of cases in which the best results have been obtained by lobectomy or pneumonectomy are, namely; cases of bronchostenosis and the failures of theoracoplasty to close cavities. We believe that the very favorable response of endobronchial tuberculosis to streptomycin will decrease the frequency of tuberculosis bronchostenosis.

The group of thoracoplasty failures are the preferable group of patients for lobectomy or pneumonectomy, and at present we feel this constitutes the main indication for such surgery. However, we are selecting occasional cases of lower lobe lesions for lobectomy which have not satisfactorily responded to other collapse measures and in occasional instances lobectomy has been performed and tuberculosis not definitely diagnosed until histopathological examination was made. In a few upper lobe lesions lobectomy has been selected as preferable to thoracoplasty. However, it is our present policy to carry out an upper phase thoracoplasty three to six weeks prior to lobectomy and remove long segments of the fourth and fifth rib at the time of lobectomy. At least a two-stage thoracoplasty precedes pneumonectomy, and overdistention of remaining tuberculous lung tissue after

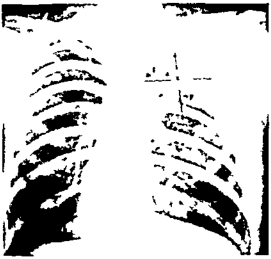

Fig 21 Extensive disease, right small cavity, left *(Case 9)*

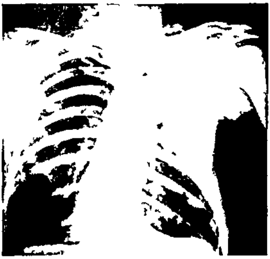

Fig 22 Post thoracoplasty, 10 months Cavity still present *(Case 9)*

lobectomy is "an undesirable physiologic state for a lung harboring a lesion of low grade activity"[16]

From January 1947 to April 1948, eight lobectomies and two pneumonectomies have been performed at Fitzsimons General hospital for tuberculosis Pulmonary excisions for *tuberculomas are not included in this report* The following case reports are representative

Case 9 A 35 year old white male patient was found to have evidence of pulmonary tuberculosis on x ray examination in March 1946 Repeated sputa examinations were positive for AFB On June 26, 1946 a pneumoperitoneum was induced and supplemented on June 20, 1946 with a right phrenemphraxis There was no improvement following this therapy He was admitted to Fitzsimons General hospital Sept 28, 1946 (Fig 21) Examination on admission to this hospital revealed an asthenic white male appearing chronically ill and having a severe cough productive of 75 80 cc of mucopurulent sputum per 24 hours Admission x-rays revealed an irregular parenchymal infiltration over the second and third left interspaces The right upper lobe showed dense infiltration and the presence of a 3 5 cm cavity.

In December 1946 the patient continued to run a daily low grade temperature elevation and his cough was productive of ¾ cupful of sputum per day. The case was reviewed and thoracoplasty preceded by streptomycin was decided upon as the treatment of choice On Jan 23, 1947 he was started on streptomycin Between February 3, and April 7, a four stage, seven rib thoracoplasty was performed without event (Fig 22) X ray films of May 28 showed the presence of residual cavity beneath the thoracoplasty. The patient's clinical condition had, *however, improved markedly*. Postoperative smear and culture of sputum was persistently positive for AFB No change was noted in the residual cavity and on Dec 22, 1947, a right upper lobectomy was performed (Fig 23)

His postoperative course was uneventful He received streptomycin for four months before, during and after his thoracoplasty A second course of 1 Gm daily was carried out in association with his lobectomy although he was already resistant to streptomycin A total of 330 Gm of streptomycin was given without appreciable toxic effects His sputum has been negative since operation, and in April 1948 his general condition was good

Case 10 A 32-year old white male gave a history of cough, chest pain and weakness dating from January 1947. He was admitted to Fitzsimons General hospital, June 27, 1947 Repeated sputa *examinations were negative for* AFB X-ray examination revealed one large and several small cavities in the right upper lobe. At the time of admission, the patient had a cough productive of ½ to one cupful of mucopurulent sputum per 24 hours with occasional blood streaking A provisional diagnosis of lung abscess was made (Figs 24, 25). He was given penicillin intramuscularly and by aerosol with some clinical improvement Bronchoscopy was negative Bronchograms showed *a saccular and cylindrical bronchiectasis in the* right upper lobe

Lobectomy on the right upper lobe was performed Sept. 19, 1947. Because of the consistent finding of Aerobacter aerogenes in the patient's sputum he was placed on streptomycin, 1 Gm daily, on August 16 and this continued until November 7. Pathological examination of the removed lobe revealed granulomatous tissue, caseation in the cavity wall and was diagnostic of tuberculosis (Fig 26). Streptomycin 1 Gm. daily was again

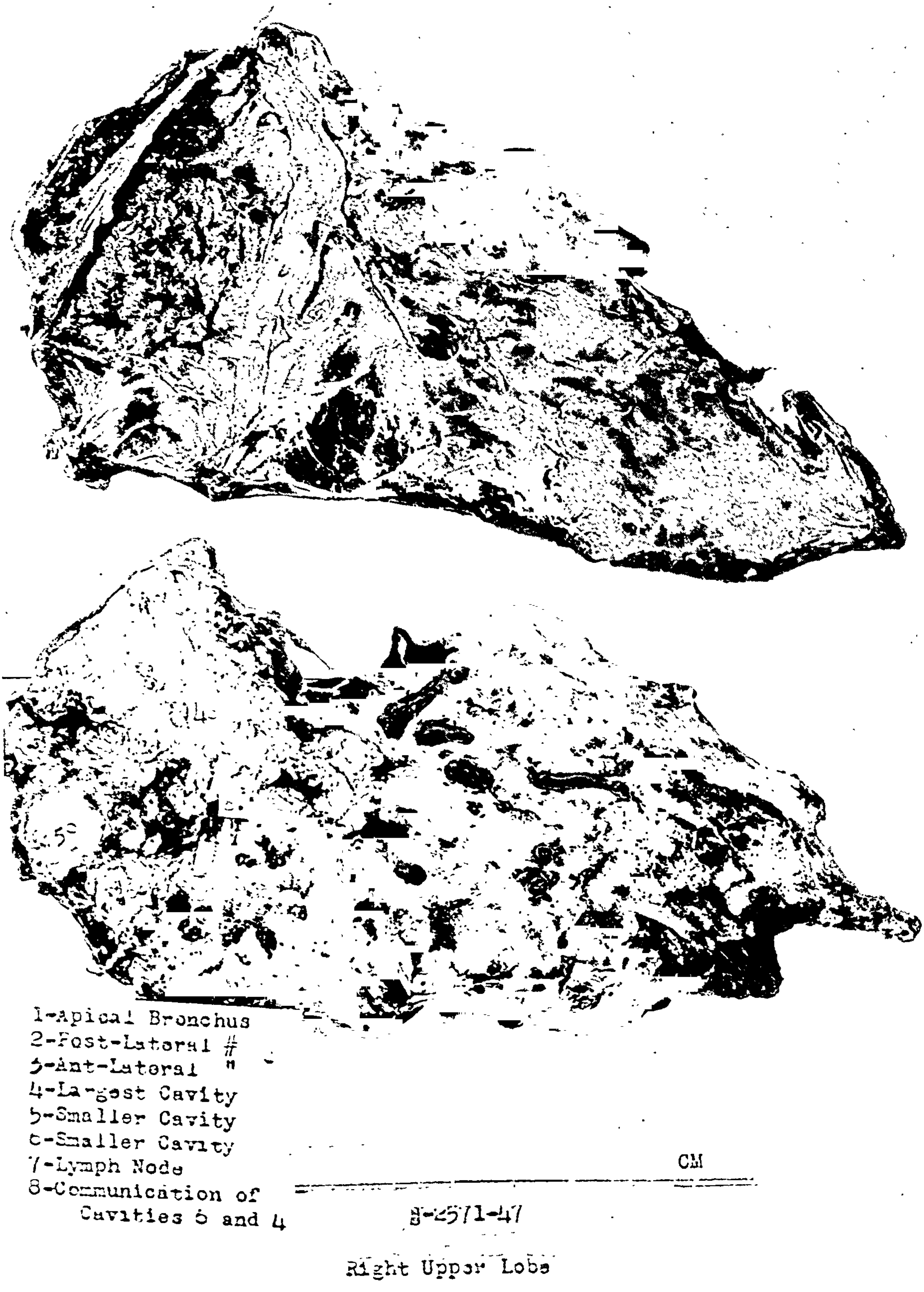

Fig. 23. Surgical specimen, right upper lobe *(Case 9)*.

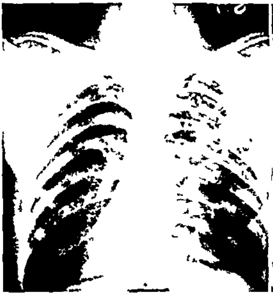

Fig 24 Multiple cavitation, right *(Case 10)*

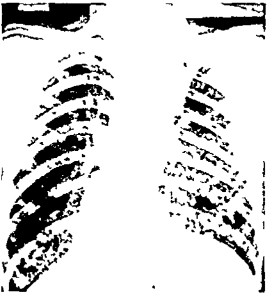

Fig 25 Atelectasis and cavity, right upper lobe *(Case 10)*.

started on November 17 and continued until Jan 12, 1948

The postoperative course was entirely uneventful X-ray examination of his chest in March 1948 revealed an essentially normal chest aside from evidence of rib resection due to lobectomy The diagnosis in this case was not definite prior to microscopic examination of the removed lobe He has been advised to have an upper phase thoracoplasty but because of his general well being he has declined this recommendation

Case 11 This 28-year-old white male officer was well until January 1947 at which time he complained of mild productive cough Roentgenogram of the chest revealed a nodular type infiltration in the right upper lobe with cavitation and left mid-lung infiltration (Fig 27) His sputum was positive for tubercle bacilli He was admitted to Fitzsimons General hospital, Feb 17, 1947 Right artificial pneumonothorax was established March 3 After three refills of air an atelectasis of the right upper lobe developed He was immediately bronchoscoped and a small amount of thick secretion removed It was noted that there was a rather marked angulation of the right upper lobe bronchus His atelectasis was partially improved.

On March 18 he was started on streptomycin 1 Gm daily. Pneumothorax was continued with some decrease in the size of the cavity In September 1947 he suffered an acute upper respiratory infection and the cavity was noted to increase in size In October roentgenogram of the chest revealed atelectasis of the entire right upper lobe which was considerably relieved by bronchoscopy (Fig. 28). The atelectasis recurred in November. Due to the persistence of cavitation in the partially collapsed upper lobe, lobectomy was decided upon as the choice procedure On December 27 he was started on a second course of streptomycin 1 Gm daily Two stages of thoracoplasty were carried out during January 1948 and lobectomy on the right upper lobe was performed Feb 17, 1948 Postoperative course was uneventful Sputum examination was negative in March 1948 and x-ray examination of chest revealed no evidence of tuberculous involvement (Fig 29)

Case 12 A 32-year old white male was admitted to Fitzsimons General hospital June 1944 The patient had the onset of his disease in early 1944 when he had noted six months of cough and excessive sputum production (Fig 30). An x-ray in August 1944 revealed a fibrocaseose cavernous type of lesion in the left lung On the first hospital day his fever was 106° F and a blood smear revealed plasmodium vivax He was treated with atabrine and has had two relapses during 28 months. Sputum was positive Sedimentation rate was 24/60, hemoglobin was 14.8 He continued to run a low grade temperature between 99 and 101° F. A pneumoperitoneum was initiated on Oct 5, 1944 On March 11, 1945, he developed fluid in his left chest. A left thoracentesis was performed and 400 cc. of yellow, slightly cloudy fluid was obtained. The patient was retired from the Army and he left the hospital in May 1945 for admission in a private sanitarium.

While in this sanitarium he had an acute onset of rising temperature, a toxemia characterized by anorexia, nausea and vomiting and abdominal distention. An abdominal paracentesis was performed and 1000 cc. of purulent fluid was obtained. Oxygen was put into the peritoneal cavity. The

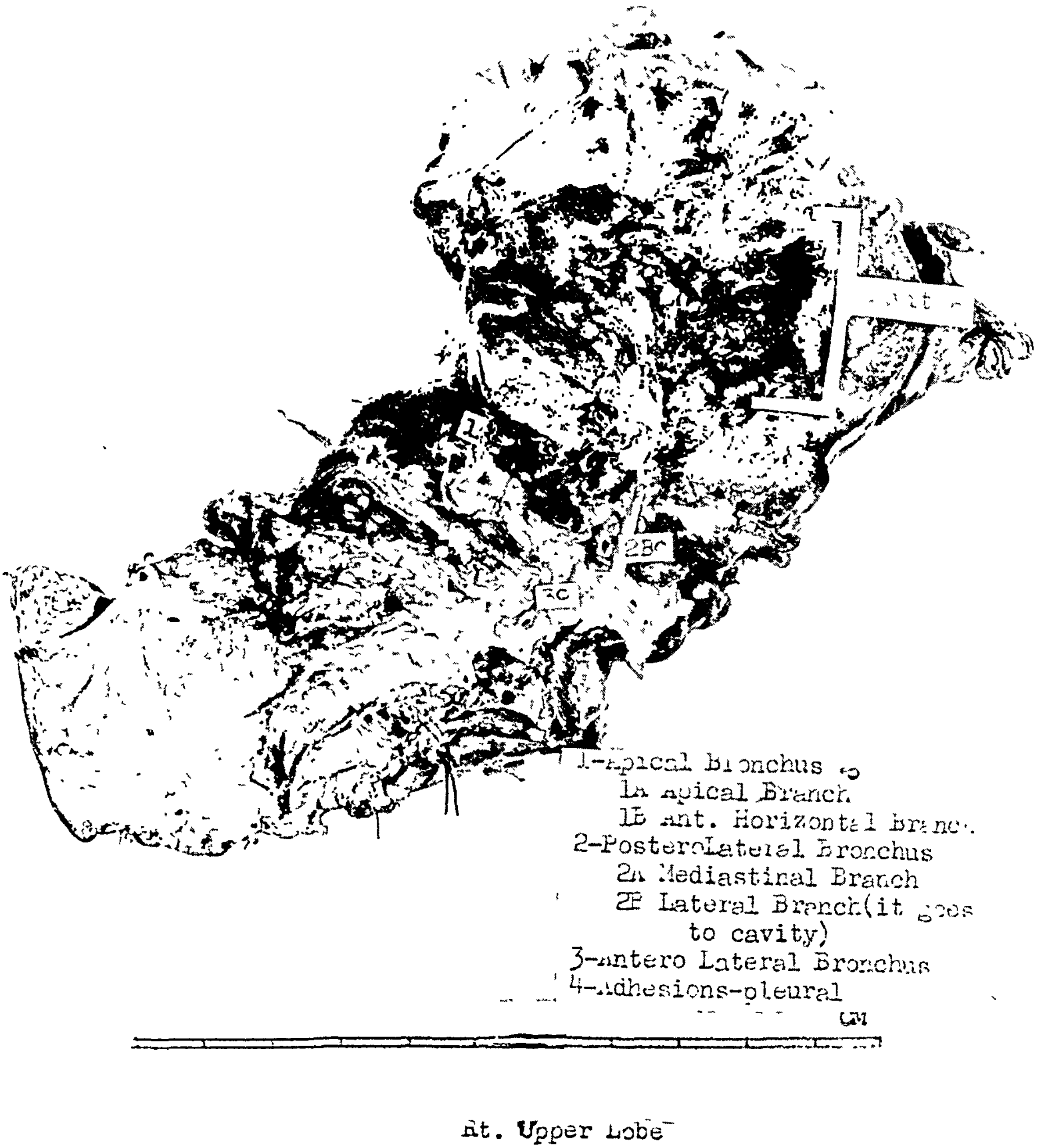
1
2B
1-Apical Bronchus
1A Apical Branch
1B Ant. Horizontal branch
2-PosteroLateral Bronchus
2A Mediastinal Branch
2B Lateral Branch(it goes to cavity)
3-Antero Lateral Bronchus
4-Adhesions-pleural
CM
Rt. Upper Lobe

Fig. 26. Surgical specimen, right upper lobe *(Case 10)*.

condition was diagnosed tuberculous peritonitis and treated by streptomycin locally in the abdominal cavity, and systemically.

The patient was readmitted to our hospital on Nov. 11, 1946. He was somewhat toxic and had a slight jaundice. X-ray on this admission as compared to his discharge x-ray in May 1945, showed some clearing in the left lung and fibrosis in the right upper lobe. The large cavitation, left was still apparent. Streptomycin was instilled into the abdomen as well as penicillin and sulfadiazine. Intramuscular streptomycin was initiated Nov. 25, 1946. The patient developed a thrombophlebitis of the left leg. He was treated conservatively and the thrombophlebitis cleared within two weeks. *In December 1946, he developed a heart block* and a pulsus bigeminus, and continued on digitalis until March 1947. During the early months of 1947 it was felt that the tuberculous peritonitis had become quiescent as well as his other symptoms. His streptomycin was discontinued in March 1947 (Fig 31). Streptomycin was reinstituted on April 25. Three stages of thoracoplasty were performed between May 2 and June 17, 1947. An x-ray in July revealed that there was residual cavity beneath the thoracoplasty (Fig 32). Sputum remained positive.

Clinically his symptoms were much improved. He gained a little weight. His sputum and cough were much decreased and his temperature was normal. There was no apparent spread during surgery. Streptomycin was discontinued on October 29. *On November 20 he had an attack of hematuria.* Cystoscopic examination revealed edema and inflammation about the orifice of the right ureter believed to be consistent with urinary tuberculosis. X-ray of the chest revealed the cavity to be still apparent, somewhat smaller than prior to thoracoplasty. It was believed that the patient would come to lobectomy. He had become resistant to streptomycin at the end of his first course of therapy in April 1947 and he had remained resistant to the drug. The organism grew 100 percent growth on a 100 mg of streptomycin. It was felt that this antibiotic therapy might be favorable for his future surgery *even though he was resistant to the drug.* The streptomycin was reinstituted on Jan 28 1948.

On March 11, 1948 a left pneumonectomy was performed (Fig 33). Prior to surgery it was noted that the patient's sputum production had increased markedly from ½ cup to three cups daily. The true significance of this finding was probably not thoroughly appreciated. Following surgery the patient had a very hectic course. The temperature ran between 101 and 104° F. X-ray of chest suggestive of an extension of his tuberculosis to the contralateral side. His dyspnea gradually increased as well as the temperature. In spite of all therapeutic efforts the patient rapidly went downhill. Postmortem examination revealed extensive dissemination of tuberculosis in right lung.

Certain observations have been made by our pathologists which tend to confirm the clinical improvement noted in patients suffering from tuberculosis who receive streptomycin. In a preliminary report based on the study of 35 patients who were treated with streptomycin for at least one month and who died, certain histological features were noted and interpretation of these features suggested. These observations were: "When the patient has shown clinical and x-ray evidence of response (even when temporary), tubercles showing an unusual histological architecture can be found which suggest a stage of healing. Conversely when slides are examined without knowledge of the history and therapy the presence of such altered tubercles strongly suggest that streptomycin treatment has been used. This alteration of tubercle architecture is not a single static typical change but falls into a pattern of alteration. First where there is some, though slight, response to streptomycin therapy, tubercles are epithelioid in type

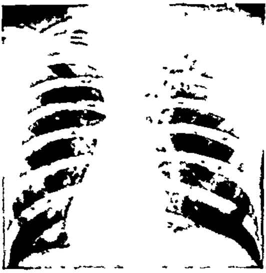

Fig 27 Cavity, right upper lobe *(Case 11)*

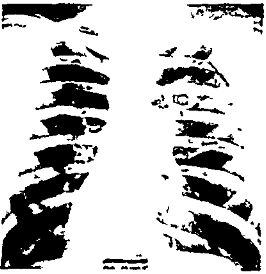

Fig 28 Pneumothorax complicated by atelectasis and cavity fails to close *(Case 11)*

with little or no perifocal exudative reaction. (For this reason at autopsy the lungs grossly appear "clean" indicating less than expected perifocal inflammatory reaction.)

"When greater response has occurred the typical organized epithelioid architecture disappears in proportion to the degree of response. Tubercles then may appear loose, edematous, unorganized, patternless, with a decrease in the number of recognizable epithelioid cells, an increase in loose reticulum fibres and sometimes with an infiltration of varying numbers of lymphocytes. An example of an extreme degree of this change was found in the lung of a patient who died of tuberculous meningitis and who had an undoubted miliary pulmonary tuberculosis which under streptomycin cleared completely by x-ray. The slides of the lung showed almost no recognizable evidence of tuberculosis but instead in-

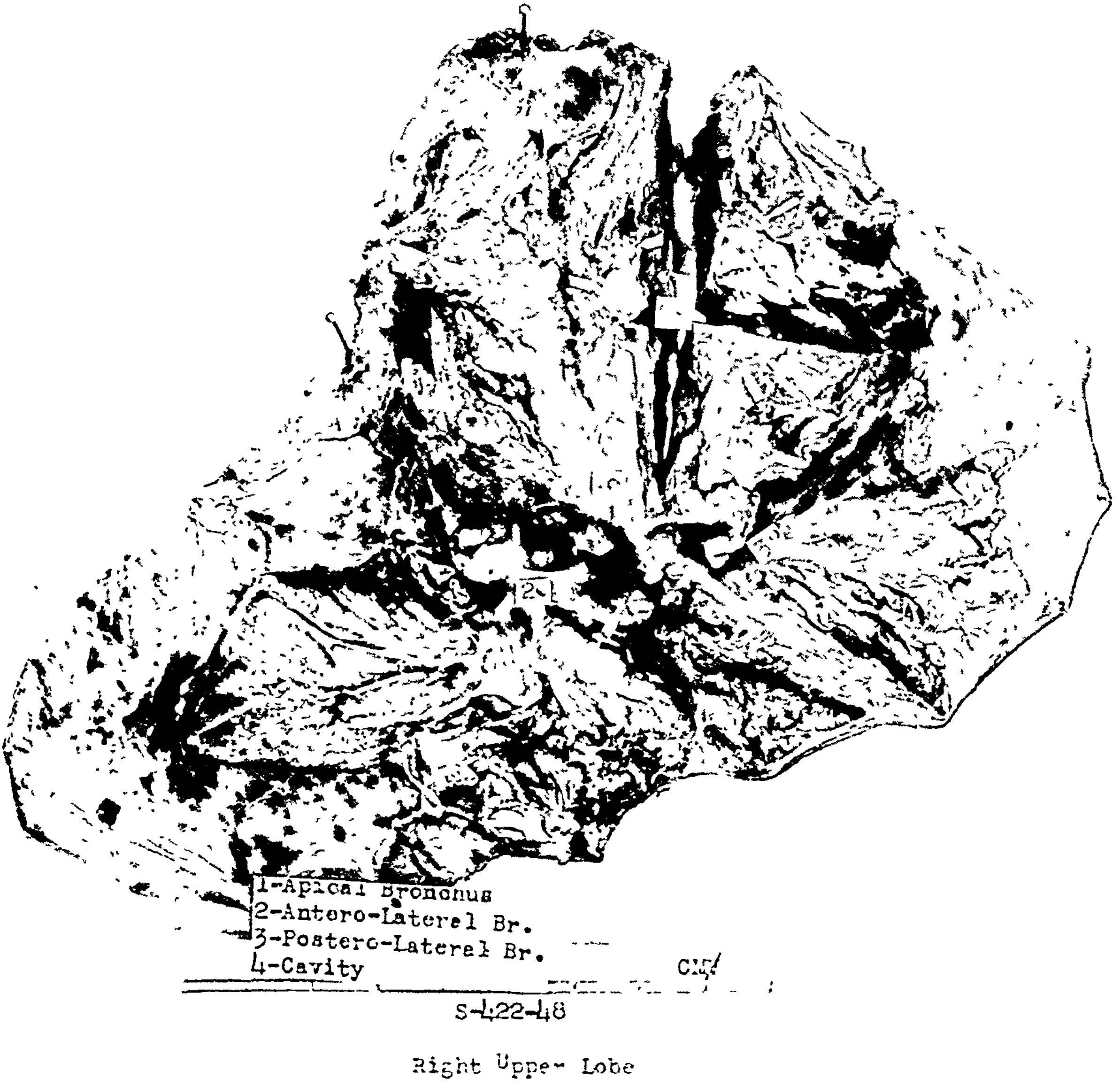

Fig. 29 Surgical specimen, right upper lobe *(Case 11)*.

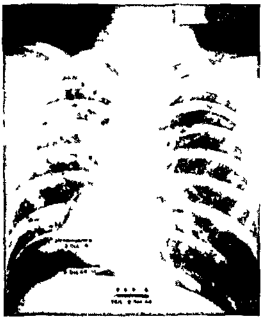

Fig 30 Extensive involvement, left *(Case 12)*

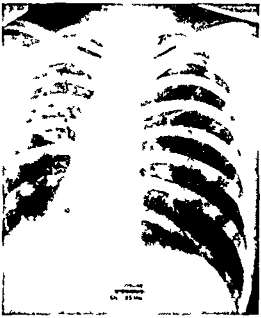

Fig 31 Large cavity, left upper lobe *(Case 12)*

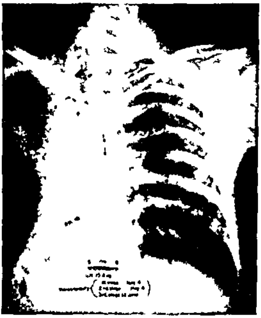

Fig 32 Patent cavity beneath thoracoplasty *(Case 12)*

numerable small sub miliary loose reticular fibrosed areas distributed where one would expect to find the miliary tubercles "

"The changes described are believed to indicate an accelerated type of healing which occurs when streptomycin exerts its so far unknown effect on sensitive tubercle bacilli This healing then is an expression of host immunity and resistance not naturally seen, since such an interference with the action of tubercle bacilli does not usually occur in nature Further, where such resistance is absent (generalized debilitating disease) no histological evidence of healing is found The effect on caseation and caseofibrotic tuberculosis is still being studied "[4]

The use of streptomycin in the preparation and the protection of patients undergoing thoracoplasty is believed to be of considerable value Its use in pulmonary resection is we believe even more essential than in thoracoplasty It is technically not feasible to avoid cutting across tuberculous pulmonary and bronchial tissue Manipulation of the diseased lung is greater than in thoracoplasty For these reasons its use in our present state of knowledge seems mandatory in pulmonary resections for tuberculosis

SUMMARY

Streptomycin has been employed in 78 patients suffering from pulmonary tuberculosis who were treated by extrapleural thoracoplasty Two hundred and thirty two stages of thoracoplasty were performed with only one patient showing evidence of a spread of the disease One other patient on whom a total pneumonectomy was performed under a thoracoplasty demonstrated an extensive spread and died

All patients undergoing extrapleural thoracoplasty or pulmonary resection for pulmonary tuberculosis should receive streptomycin before, during and after operation The experiences at Fitzsimons General hospital, U S Army are related in the use of streptomycin in the surgical management of pulmonary tuberculosis i e, thoracoplasty and lobectomy or pneumonectomy

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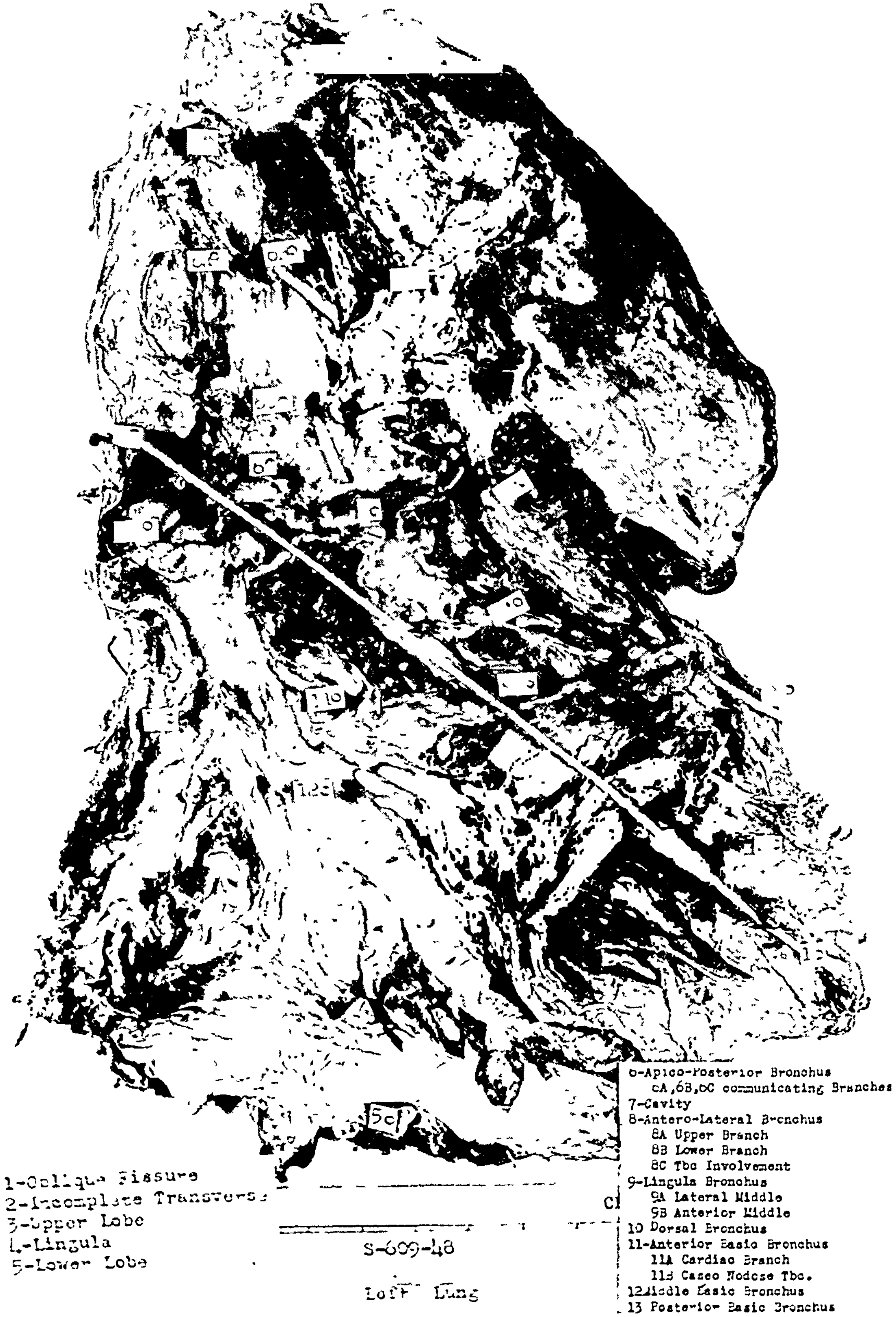

Fig 33 Surgical specimen, left lung *(Case 12).*

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Late Complications of Traumatic Dislocations of the Hip Joint

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I WAS recently summoned to court to supply evidence as an expert witness in a lawsuit for personal injury arising from a traffic accident. This occasion enabled me to emphasize late complications of traumatic dislocations of the hip joint. A brief summary of the case history follows.

On Feb. 15, 1943, a man aged 66 fell out of a tramcar because of a collision. He fell directly before the wheels, and, pressed as he was to the sidewalk, the car carried him away. He was brought to a city hospital by ambulance. Clinical examination showed dislocation of the right hip joint. A roentgenogram taken the following day showed the femoral head of the right hip joint dislocated up and backward. The femoral shaft was fixed in adduction. There were no appearances indicating a fracture. (Fig. 1.)

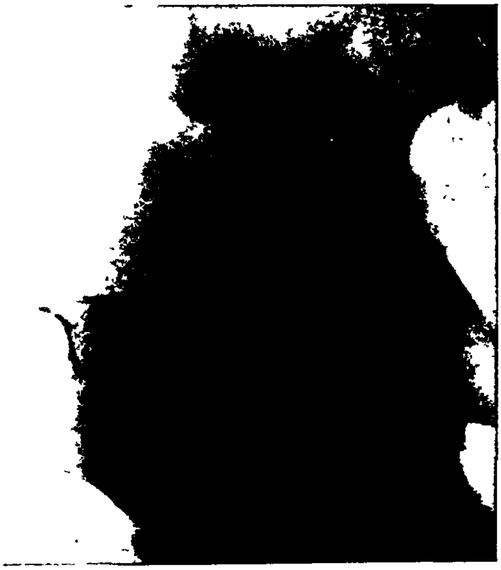

Fig. 1.

Two days later the dislocation was successfully reduced with the patient under narcosis. He was confined to bed—minor rises of temperature followed.

A week later the control film showed the relation of articular surfaces in the right hip joint to be normal. Luxation had ceased to exist. There was one fragment broken from the upper and one from the lower corner of the acetabulum. (Fig. 2.)

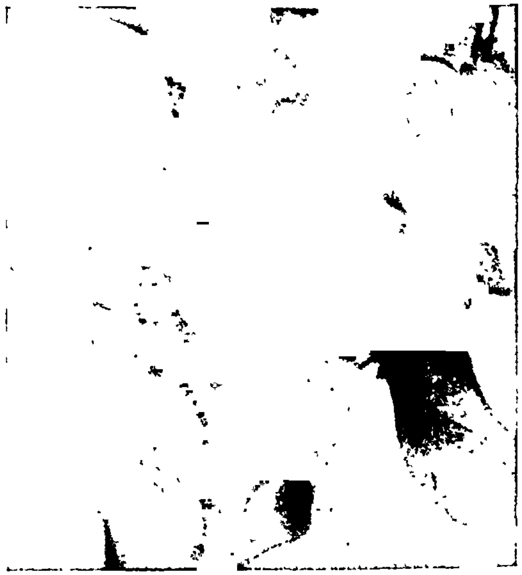

Fig. 2.

On February 26, the patient sat up and attempted to walk. Two days later he walked satisfactorily with the aid of a stick.

On March 2 there was moderate pain on walking although the joint was not swollen. He was dismissed from the hospital in improved health.

In March and April the patient came regularly to the St. Gellért Thermal Bath to undergo bath and diathermic treatments. Zander and massage treatments had been discontinued early at the patient's request because his pains increased after these treatments.

Since his condition did not improve as had been expected, the patient began visiting orthopedic surgeons In May he sought the advice of a prominent orthopedist On examination the right hip was painful and its movements restricted The specialist prescribed treatments at St Gellert Bath

In June 1943, the patient was examined by another excellent orthopedic surgeon He then *complained chiefly of his knee contractures* These he had suffered long before the accident, but they were causing him more trouble at this time On examination a contracture of approximately 10 degrees and a flexive genu valgum were found A shoe inlay and further mud and massage treatments were prescribed

In October 1943 the patient's *condition be*came worse whether abruptly or gradually cannot be stated exactly Nevertheless he took to using crutches and continued visiting the Bath, though previously he had been able to cover this distance with the aid of a stick

A medicolegal expert's advice was asked for —after the first session of the court in the patient's lawsuit, which took place in November 1943 The expert's report was *not finished* until April 1944 Meanwhile the patient, his condition steadily declining had visited another specialist, who had a new roentgenogram taken (Fig 3)

This showed wedged in fracture of the femoral head The upper part of the articular space was narrowed A calcified band extended from the major trochanter toward the acetabulum A diagnosis was made of the wedged in fracture of the femur with coxitis and periarthritis On Jan 28 the same roentgenologist gave a new interpretation of the film, *reporting that almost the entire medial surface* of the femoral head was fractured *There was minute dislocation medial* and downward The articular space was diminished There was a faint connection between the major trochanter and the upper part of the acetabulum He diagnosed the condition as fracture of the femoral head with minute dislocation and periarticular inflammation *(artificial?) with a calcifying band* Considering this interpretation, the orthopedic surgeon advised the patient to undergo an operation and also to use a walking apparatus

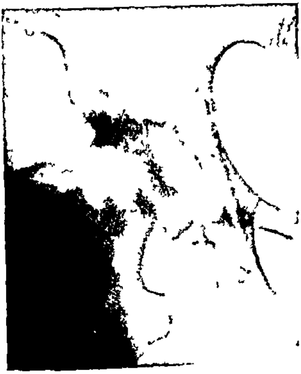

Fig 3

From the medicolegal expert's report I should like to point out the following items

"According to the statement made by the patient, his condition after the bath cures was so good that he was able to walk with the *aid of a stick In November, however, his condition* changed so much for the worse that he was no longer able to walk without using crutches The alleged aggravation and his present condition cannot be accounted for by the evidence at my disposal This radiograph leads me to the conclusion that the aggravation in the patient's condition was due to a new accident, from which the fracture of the *femoral head arose It is unimaginable that a* dislocation, combined with a fracture, could *have been successfully reduced* It is unbelievable that on two repeated roentgen examinations the fracture of the femur would have remained undetected and it is unexplainable how the fracture, had it arisen from the accident of Feb 15, 1943, escaped detection when the patient has been repeatedly examined by specialists The dislocation fairly well healed as it was, left the patient in no *need of either an operation or a walking apparatus*"

Radiograph analysis taken on May 31, 1944 showed the joint space—especially the upper part of it—of the right hip markedly diminished The articular surfaces were irregular, the surroundings of the diminished section were sclerosed The fractured ends appeared to be wedged into each other. No callus was visible along the fracture line, but its existence could not be excluded. Calcified spots appeared between the trochanter major and spina iliaca anterior inferior (calcified bands)? The left hip joint was free. Both sacroiliacal joints were ossified.

The orthopedist, suggesting an operation, stated on June 4, 1944: "In the radiograph taken Feb. 16, 1943, in addition to the appearances indicative of dislocation, the fracture of the femoral neck was visible. In the radiograph taken Feb. 24 the femoral head appeared in the acetabulum and the fracture had also been united.

On July 12, 1945, the medicolegal expert reaffirmed his previous opinion, denying the presence of a fracture in any of the first two radiographs. He suggested that the opinion of the Institute of Radiology should be heard.

On September 12, I took the stand and answered questions exclusively concerning the presence or absence of appearances indicative of fracture in either of the first two radiographs. I stated that no appearances indicating a fracture were featured by any of them. The difference in length of the femoral neck in the two films was due to shortened projection. The shortened projection of the first one offered a less trustworthy observation to detect a fracture. The second one, on the other hand, exhibited neither the cortical disintegration primarily characteristic of fractures nor any sign of a displacement. This proved the absence of a fracture.

In January 1947, the lawyer for the plaintiff stated that the expert evidence supplied by the Institute of Radiology did not cover every question he had asked. He requested further evidence, concerning all the necessary questions. He also demanded that every written document and radiograph be sent to the Institute of Radiology.

In the radiograph of Feb. 17, 1947, only one-third of the femoral head was visible. It was somewhat flattened and slipping downward—but largely in its proper place in the acetabulum, covering the neck like a cap. The contours of this remainder of the head were sharp. The outline of the acetabulum opposite was also sharp. The articular space was diminished as compared with that of the sound side. A small part of the upper third of the femoral head was faintly visible: this part was also flattened and was pressed against the acetabulum with its greater part absorbed. (Fig. 4.)

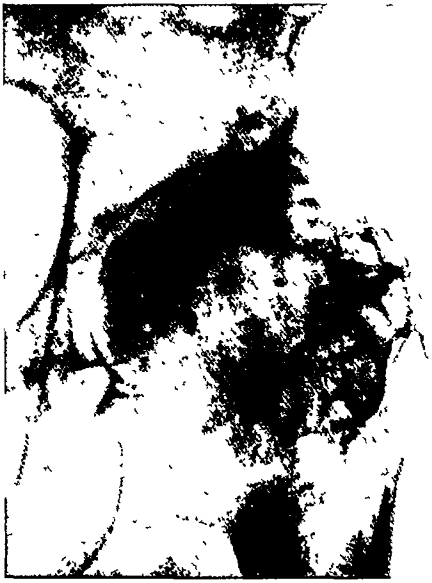

Fig. 4.

The femoral neck appeared to be slipping upward and somewhat laterally, leaning partly against the upper small remainder of the head and partly against the acetabulum. The lower medial part of the acetabulum largely preserved its outline. The upper outer part was flattened and broadened laterally. The articular space was nothing but a faint line in its upper lateral section. The medial third of the acetabulum was decalcified. Its upper lateral part was bordered by a markedly sclerosed lining, expanding laterally. The upper end of the femoral neck, leaning against the acetabulum, appeared as a homogenous, sclerosed shadow about 1 cm. wide, its lower section was markedly decalcified, and small cystlike rarefactions were visible within its substance. In the capsule, between the trochanter major and the acetabulum, several dense, sclerosed spots appeared, which seemed to stiffen the joint.

Both intra- and periarticular changes had increased, and their presence fully explained the rigidity of the joint.

My evidence as the medicolegal expert was as follows

"I entirely abide by my previous statement as to the radiographs of Feb 16 and 24, 1943

1 *The expert had been wrong in his analysis* (dated July 6, 1944) when he thought he could detect a fracture of the femoral neck in any of the radiographs taken immediately after the accident, i e, those taken during February 1943 As I pointed out in my former statement, there are no appearances suggesting a fracture in any of them

2 Answering the question whether the radiographs of February 1943 and of January and May 1944 were taken in identical planes, I stated that they were as far as the praxis was concerned, except for the fact that the femoral head was shown in dislocation in the radiograph of Feb 16, 1943, therefore the femoral head and neck, as well as the upper third of the femoral neck, appeared on a level different from that of the subsequent three radiographs It must be assumed that the three latest radiographs were taken in identical planes the asymmetric position of the pelvis on them does not interfere with their being properly interpreted

3 A wedged in fracture of the right femoral neck is definitely exhibited in the radiographs taken in January and May of 1944 These radiographs also featured—as was stated by the radiologist by whom they were taken a diminution of the articular space and a certain compression of the femoral head The sclerosed lining of the upper part of the acetabulum and the calcification of the bands are easily detectable, especially in the latest film

4 To the question whether correlation could be established between the fracture shown by the two latest radiographs and the injury sustained in February 1943, my answer is decidedly in the affirmative *This later developed fracture is direct consequence of the injuries caused by the dislocation and by its reduction*

Realizing the importance and responsibility of my statement, I offer the following detailed explanation

The medical profession has not sufficiently realized the fact that a dislocation cannot be considered completely cured after it had been reduced This patient spent three weeks in bed with or without fixation and extension In 1933, Dyes reported the history of an adolescent in whose femoral neck rarefactions *developed, condensed islands in the femoral* head could be detected two years after the successful reduction After an additional two years the femoral head became completely destroyed and the femoral neck was pressed into the acetabulum He also referred to a similar case reported by Rehbein some years previously and noted as the first such case ever published, which paralleled the necrosis *of the femoral head with osteochondritis* juvenilis (Perthes) and osteochondritis dissecans (Konig) He concluded that these three types of aseptic necrosis were manifestations of the same sequence of changes, differing only in degree and extent

In 1936 Blumensaat summarized a series of 11 cases and, adding to them three of his own, stated that necrosis of the femoral head caused by *traumatic luxation of the hip*, was an independent, well defined sequence of changes, which may resemble Perthes' or Konig's disease but is not identical with either He suggested the term secondary osteonecrosis

In 1939 Mutschler and Buch Hirschfeld each reported a similar case, and Pfab listed 26 cases of hip joint luxations observed and controlled in the Orthopaedic Hospital of *Graz from 1920 to 1934 He mentioned two* adolescents with typical deformities resembling those associated with Perthes' disease, occurring 15 to 16 years after the dislocation No necrosis of the femoral head was mentioned

In 1940, Roth rejected optimism as far as end results are concerned He investigated the cases of 41 patients with hip luxation and *reported that only 16 percent of them showed* complete restitutio ad integrum Deformities similar to those of Perthes' disease were also mentioned among late complications

In the 1939 edition of Schinz' book the case history published by Dyes had already been mentioned

Brailsford pointed out in his book, "Radiology of Bones and Joints" (London, 1945), that, however normal the *roentgenograms* taken immediately or shortly after a successful reduction may seem, the possibility of late complications should always be borne in mind.

Late complications of traumatic hip dislocations may manifest themselves in peri, intra, and extra-articular changes. Among the extra-articular ones, *myositis ossificans* is of major importance. Its occurrence in the hip joint is rare. It is mostly observed in cases of cubital dislocation, but when it is extensive a restriction in the movements of the joint may result. Reappearance after operation is rare.

Peri-articular lesions are the most frequent. These are characterized by calcification of the capsular bands and by spur formation. They generally cause no complaints, even if there is an extensive spur formation.

Fragmentation of the acetabular margin is the commonest intra-articular change. The fragments never remain loose bodies, as in cases of dislocation of the knee and cubital joints. Instead they become worn out and absorbed, causing no complaints at all. The rarest and most serious intra-articular change is *necrosis of the femoral head.*

The progress of necrosis of the femoral head in children and in the very young bears a strong resemblance to that of Perthes' disease, save for the final deformities which are on a larger scale. In spite of these deformities the greater part of the femoral head avoids destruction. The severest features are exhibited in adolescence. The onset of the symptoms is similar to that of Perthes' disease, except that the femoral head in this disease never regenerates but becomes absorbed. This change is best illustrated by the Dye's case.

In advanced age, necrosis usually destroys parts of the femoral head only, the upper lateral third or half being most frequently involved (this part is most exposed to weight-bearing on walking). This part of the femoral head may appear completely compressed, with a detached part displaced in a downward and medial direction. The femoral neck, separated from the head, is pressed into the outer lateral part of the head and leans against the upper lateral acetabular margin. The acetabulum itself becomes flattened—just as in cases of congenital luxation—owing to the changed mechanics, its outer-upper part being flattened. This part of the acetabulum is always covered by a sclerosed lining.

As to the *causation* of this severe change, opinions are not uniform in every detail. The supposed causal factors are: 1. Defective circulation of blood. 2. Lesion of the femoral head, primarily due to trauma, secondarily to premature exposure to weight-bearing. 3. Combination of 1 and 2. 4. Potential exogenous factors (constitution, etc.; *Dyes*).

Injury to the vascular supply is the most accepted causal factor. It may be supposed that the nutritive arteries of the femoral head, in case of a dislocation (in obturator dislocation the arteria obturatoria), would be subjected to pressure and consequently that the vascular supply would be limited or stopped. It is not very likely, however, that such a temporary compression can have major significance, because—as is shown by a review of case histories—the development of late complications is influenced neither by the direction of the dislocation nor by the time elapsing between dislocation and reduction. Necrosis of the femoral head developed in cases of dislocations into various directions, and also when dislocation had been immediately reduced.

Arteriosclerosis as a causal factor may also be considered. Schmorl's experiments revealed that arteriosclerosis has no influence on the blood supply of the femoral head. Apparently osteoporosis or necrosis may develop in patients without any arteriosclerosis: at any rate, many cases are reported in which the patients are young. The cause of interference with the blood supply should be sought in rupture of the vessels due to dislocation.

The anatomic and anatomopathologic investigations of Nussbaum, Schmorl, Bergmann and others revealed that blood is supplied to the femoral head by the following arteries: 1. Terminal branches of the arteria circumflexa femoris lateralis and medialis: arteria cervicalis anterior and posterior, through the upper neck section of the capsule. These arteries spring from Aa. profunda femoris, sometimes directly from the arteria femoralis. 2. Terminal branch of arteria obturatoria, which penetrates into the femoral head within the substance of the ligamentum teres. All these arteries abundantly communicate with each other. Contrary to some opinions, it must be ascertained that blood communication through the ligamentum teres is still maintained in advanced age. It [illegible] cepted that there is no va[illegible] tion between the metaphy[illegible] within the substance of t[illegible] tainly so in early age, [illegible] tion line exists. [illegible] in the periosteum-like [illegible] of the opinion that [illegible] an intra[illegible] physis and [illegible] His [illegible] The problem of [illegible] later.

Interference [illegible]

creased calcium content and a *denser appearance of the femoral head* may be exhibited in radiographs of children, sometimes as soon as two or three months after the luxation. When the pericapitular bones are decalcified and both acetabulum and femoral neck are affected by osteoporosis, this increase may be diagnosed in a unilateral radiograph. But it can be always traced when compared to the sound side, therefore, radiographing both hips on the one plate is essential.

Many explanations have been put forward to account for this increased deposition of calcium in the femoral head. It is known that a sequestrum—a piece of bone deprived of its blood supply—usually appears denser and darker than the surrounding bones. Absorption of soft tissues may account for this, as a result of which the bone becomes relatively denser and heavier.

Brailsford is of the opinion that the sequestrum—the epiphysis in my case—attracts calcium from the surrounding bones. Thus the distribution of calcium is changed in a relatively small area. The sequestrum then becomes denser and heavier, while the surroundings become osteoporotic. When regeneration begins, the process is reversed. The calcium concentration of the femoral epiphysis is not only relatively but absolutely increased, according to this theory.

2. In adolescents and adults—and in children in the later stage—small *cystlike rarefactions* may be traced in the femoral head and in the metaphysis of the neck, indicative of necrosis. When the femoral head is somewhat flattened, the compressed part appears to be denser and sclerosed.

3. I wish to add a new radiographic sign to those already mentioned, which has not been recorded by any of the authors. It is *the early diminution of the articular space.* I have seen it on every radiograph that has been published, though no attention was directed to it. Early detection and proper interpretation of this important evidence is of great significance; it is the first sign indicating the onset of changes in adolescents and adults. Explanation of this phenomenon is simple. The articular cartilage, deprived of its blood supply, is subjected to destruction; and, since in a radiograph the quality of the articular space is shown by the width of the cartilage, a change diminishing this width would lead to a diminution of the space as well.

Should any of these signs appear in any radiograph one may be sure, that one faces this serious disease. It must be realized that if the attacked head were exposed to further weight bearing the result would be its complete destruction. Therefore the affected limb must be immobilized and complete freedom from action must be secured for it. There will then be some hope that further change will not occur.

Competent orthopedic surgeons are well aware that serious complications may follow traumatic hip luxations, but unfortunately this knowledge is not always exercised in practice. Patients are dismissed from hospitals two or three weeks after reduction of their traumatic hip joint luxations, and no control radiograph is taken even if they return with further complaints a few months later.

SUMMARY

The case is reported of a man aged 66, who suffered a hip-joint luxation, which was correctly reposited. Half a year later he "suffered a fracture of the femoral neck. On request, the author as expert witness in the lawsuit, stated that the late fracture of the neck and femoral head was a consequence of the first trauma, being an "osteonecrosis aseptica femoris."

The supposed causal factors of late osteonecrosis aseptica are: (a) defective blood circulation; (b) subchondral fractures and untraceable spongiosa fragmentations as seen in Kümmel's disease, and (c) a combination of (a) and (b).

Early radiologic appearances are: (1) a denser appearance of the femoral head; (2) cystlike rarefications in the femoral head and neck, and (3) early diminution of the articular space.

The development of such serious changes may be prevented by early diagnosis. The limb should be immobilized to protect it from the effects of too early use.

Neoplastic Disease of the Neck of the Bladder in Women

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DURING the menopause (physiologic, surgical or actinic) many women suffer from disturbances of micturition, sometimes mild, sometimes serious. Since these disturbances join with the many general symptoms of suppressed utero-ovarian function, inexperienced physicians often think of them as a nervous syndrome due to the menopause. Actually their basis is often anatomic.

Therefore, when a patient in the postclimacteric period complains of disorders of micturition, urethrocystographic examination should be made. This examination will frequently demonstrate deformities of the vesical neck which have the appearance of (a) undulations and ascents covered by apparently normal mucosa, (b) formations, pseudopolypoid, sessile or implanted on a large basis, and (c) mammillary formations sometimes of whitish appearance.

Heitz Boyer described in detail the morphologic character of these formations and distinguished five different types: A polypoid type with its peduncles pear shaped, ball shaped, tongue shaped, udder shaped or toothlike, etc., as well as a single sessile formation, bifid or trifid. A cystic type. 3. An edematous type, hard edema (the mammillae more or less round or dentated) or soft edema bullosum. 4. An angiomatous or pseudoangiomatous type. 5. A type consisting of small, roundish or oval neoplasms represented by small abscesses.

Up to 1930 I observed and treated these conditions in a considerable number of cases. The most frequent deformities I observed were those of the pseudopolypoid type, single or associated with soft edema.

The angiomatous formations seldom occur. Hard edematous formations, peakshaped, are frequent.

The formations may be located in any region of the vesical neck, but mostly they are observed in the lower half; they represent a pathologic entity often called "neoplastic disease of the neck of the bladder in women."

From the anatomicopathologic standpoint the neoplasms appear mostly like pinkish buttons covered by mucosa, sometimes congested, never papillomatous or bleeding. At other times they are white. Microscopic examination shows small, full, cellular buttons in connection with the vesical epithelium not exactly of adenomatous character (J. De Smeth).

From the symptomatologic standpoint cystic symptoms are observed, that is, pollakiuria, more diurna than nocturna, initial and terminal micturition pains, or a sensation of weight in the upper pubic region, in the perineum and in the vagina. Complete or partial retention of urine may be noted. In some cases there is also incontinence. The urine may be turbid because of a coexistent enterorenal syndrome, but it may be, and this is more peculiar, absolutely clear, hence the term *cystalgia* or *cystitis with clear urine*.

The urine may be sterile or may contain bacteria. If the culture gives positive results it nearly always reveals B. coli, single or associated with staphylococci.

Since the cystic symptoms may occur even with clear and sterile urine, Heitz Boyer used the term *mechanical cystitis*, which implies that the disturbance is due chiefly to a mechanical element, excrescence, which is the cause of pain and frequent micturition.

Hematuria is rare. Its chief characteristic, when present, is resistance to ordinary treatment and recidivation. As regards evolution I have never seen neoplasms of the vesical neck appear as large vegetative masses.

The prognosis of the disease is good if therapy is active and not so good when therapy is insufficient. If painful symptoms persist, the patient's physical and nervous condition, which already displays a lack of organic equilibrium, will suffer further from the nervous disorders inherent in this climacteric. Heitz-Boyer has pointed out that resentment of the menopause is serious as a factor in the patient's general condition.

When carefully treated, the patients recover dramatically. The treatment must have a triple purpose:

1. Careful destruction of the cervical neoplasms which, acting mechanically like foreign bodies, cause disturbances in micturition. Here the results of endoscopic electrocoagulation are perfect. After electrocoagulation it is advisable to insert an indwelling catheter for some days.

2. Modification of the organic field. It should be kept in mind that the neoplastic disease occurs during the postclimacteric period, when neurohormonal disorders put the female organism out of equilibrium; hormonal therapy, protracted rather than intensive, is effective for treatment of the congestive abdominopelvic manifestations and the neurohormonic disturbance. If the equilibrium of the nervous system is reestablished it will be a great relief to the patient. A follicular hormone injection of 10,000 units, administered every fourth day for three consecutive months is advisable.

3. Treatment of the infectious enterorenal condition. If the urine contains B. coli, it is advisable to use a specific vaccine and sulfamides of the guanidine series. This will modify the vasculohumoral and toxic infectious substrata of the disease, substrata that may represent a powerful proliferating stimulus and may be the cause of the vesical neoplasms.

SUMMARY

According to J. De Smeth, and as the result of many years of study, the statement may be made that this neoplastic disease of the vesical neck, which occurs chiefly during the postclimacteric period, excludes simple coincidence but suggests that the menopause, with its complex vasculo-endocrine disorders, must be considered an etiologic factor in the neoplastic disease. Toxicity and infection, which are also frequently present (T. Miotti) may be considered contributory factors.

RIASSUNTO

Ritiene, d'accordo con J. De Smeth ed in base a molti anni di esperienza, che questa speciale affezione neoplastica del collo della vescica non insorga solo per coincidenza nell'eta' postclimaterica. La menopausa, con tutte le sue modificazioni endocrino-vascolari, rappresenta un vero fattore etiologico. Possono contribuire alla sua insorgenza condizioni tossiche e settiche.

SUMARIO

De acuerdo con J. De Smeth y de acuerdo con muchos anos de estudio, se puede decir que esta enfermedad neoplastica del cuello de la vejiga urinaria, por cuanto ocurre las mas de las veces durante el periodo post-climaterico, excluye el ser una simple coincidencia y mas bien sugiere que este periodo con sus disfunciones complejas, vasculares y endocrinicas, es un factor etiologico en esta clase de neoplasias.

La toxemia y la infeccion que se presentan muy frecuentement (T. Niotti) pueden tambien considerarse como factores contribuyentes.

SOMMAIRE

Après beaucoup d'études, l'auteur J. De Smeth affirme que la maladie neóplastique du col vésical qui survient surtout dans la période postclimactérique, exclue toute simple coïncidence mais suggère que la ménopause avec ses désordres vasculo-endocriniens compliqué doit être considérée comme facteur étiologique néoplastique.

Le toxicité et l'infection sont fréquemment presents et peuvent être considerés comme facteurs contributifs.

Regional Ileitis in Turkey*

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SINCE Crohn and his associates[1] first established regional ileitis as a clinical entity, the formerly widespread belief that this condition is a form of tuberculous enteritis has been overthrown, although the actual cause is still far from being established. After Crohn's work in 1932 the subject was studied with interest. Observations have been reported from many parts of the world, mostly in confirmation of the theory that regional ileitis is a clinical entity. Some present the idea that more than one entity is included under the name,[2] from "early acute enteritis" to "extensive advanced segmental enteritis with complications."

The topic of regional enteritis first received attention in Turkey in 1943. Up to 1947, 17 cases were collected by Harmanci,[3] of which five were reported by myself. Two of these five cases were my own. Two more cases have recently come to my attention, in both of these the patients were relieved by operative treatment. Their histories are described below.

CASE REPORTS

Case 1. I. T., a married farmer aged 35, was admitted to the hospital because of bouts of abdominal pain (starting just below the umbilicus), nausea, bilious vomiting, and constipation for both stool and gas. These attacks lasted for 24 hours, after which borborygmus and diarrhea would be followed by relief of symptoms. The episodes recurred every 15 to 20 days, and sometimes the vomitus had a fecal odor. The only previous illness was appendicitis, and the patient had undergone an appendectomy a year and a half earlier.

Physical examination revealed a poorly nourished, pale man who was unable to stand up. Some of his teeth were missing, and his tongue was coated. His abdomen was slightly protuberant. There was no abdominal spasm, and no mass could be palpated. On stimulation of the abdominal wall, peristaltic waves and borborygmus were noted. The blood pressure was 100/75. The rest of the physical examination was noncontributory.

Laboratory Studies. The red blood cell count was 2.75 million. The white blood cell count was 6,800 (with 34 percent lymphocytes and 59 percent neutrophils, 5 percent stab cells and 2 percent eosinophils). The sedimentation rate was six mm per hour, Hb 52 percent. The stools revealed no occult blood and no parasites. Roentgen examination showed several fluid levels (Figs. 1 and 2).

A diagnosis of chronic ileus was made, and surgical intervention was decided upon.

Fig. 1

Operation. Kemithal sodium (sodium cyclohexenyl allylthiobarbiturate) was used for basal narcosis, and anesthesia was maintained with ether. When the abdomen was opened with a midline incision, the ileum was found to be about thrice its normal width, the enlargement being most pronounced at the distal end. This, with the cecum, was drawn into the true pelvis and was adherent to the sigmoid, the whole mass also adhering to the posterior wall of the bladder. The latter structure was carefully dissected free, whereupon attention was directed to the ileosigmoid adhesions. In attempting to divide these, it was found that the

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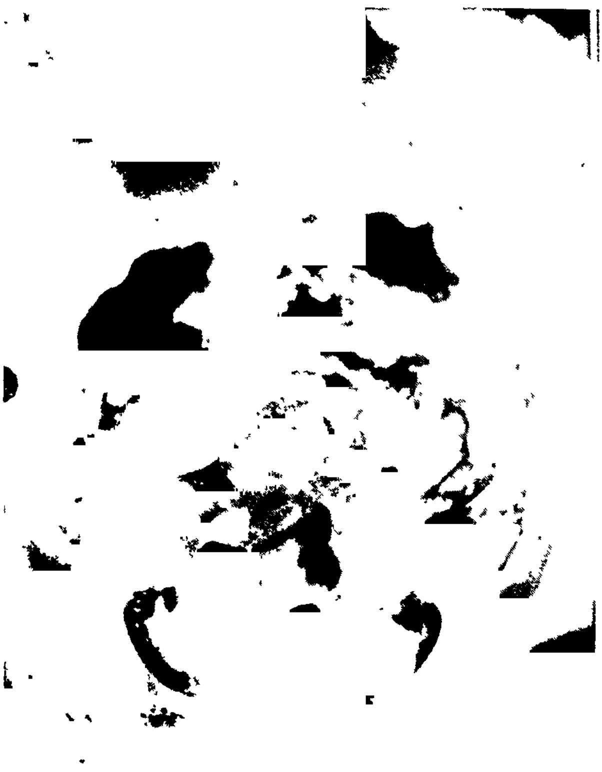

Fig. 2.

Figs. 1, 2. Radiological views of Case 1.

structures named were connected by a narrow fistula at a point corresponding to the site of the lesion in the ileum. A large area of the sigmoid was indurated owing to a chronic inflammation, and the cecum, together with the ileum (which was much narrowed by inflammation), constituted a fairly large mass.

Resection was performed between a point of the ileum 10 cm. proximal to the mass and the junction between the cecum and the ascending colon. An end-to-end anastomosis was made between the dilated ileum and the ascending colon. The defect in the posterior peritoneum was repaired with free omentum in a plastic operation, and the inflamed and indurated sigmoid was temporarily diverted through a colostomy with a small incision in the left iliac fossa. The postoperative course was good, and the colostomy was closed three months after the first procedure.

Pathologic Examination: Grossly the specimen was a mass 20 cm. long, consisting of the adherent cecum and the terminal ileum, which had lost their characteristic structure. Microscopically there were nodular cellular collections rising in the submucosa and in some areas penetrating to the muscularis and the subserous layers. These nodular cellular collections under high magnification showed round cells, epithelioid cells and a few neutrophils. In some areas there were giant cells of the foreign body type; in others, cells of the Langhans type. In scattered areas there was a tendency to cellular degeneration. Proliferating connective tissue was observed in the vicinity of the infiltrations.

Diagnosis: The diagnosis was regional ileitis (pathologist, Prof. Dr. Necati Eranil).

Case 2: G. C., a housewife aged 28, was from the department of internal medicine. Her chief complaint was of chronic constipation and gastrointestinal upsets.

The history had begun nine years before, with disturbances in defecation; constipation gradually progressed until the patient had but one bowel movement a week. She had undergone an operation for ovarian cyst.

On physical examination her general condition was found to be poor. She was pale, her abdomen protruded and there was tenderness at a point just below and to the right of the umbilicus. There was nothing else to suggest ileus, but an exploratory laparotomy was decided upon.

Operation: The ileum was found to be about double the normal width, with chronic inflammation in its distal segment, about 20 cm. from the illeocecal junction. The latter was attached by inflammatory adhesions to the posterior abdominal wall, whereas the cecum and the inflamed appendix were adherent to the true pelvis. On separation of the parts of the adherent mass, there appeared a continuous lumen between the dilated proximal portion of the ileum and its much-narrowed distal segment (Fig. 3). These were adherent to the neighboring mesenteric glands, forming a mass that was adherent to the (retroperitoneal) lower surface of the duodenum. Although the latter adhesions were easily divided, much difficulty was

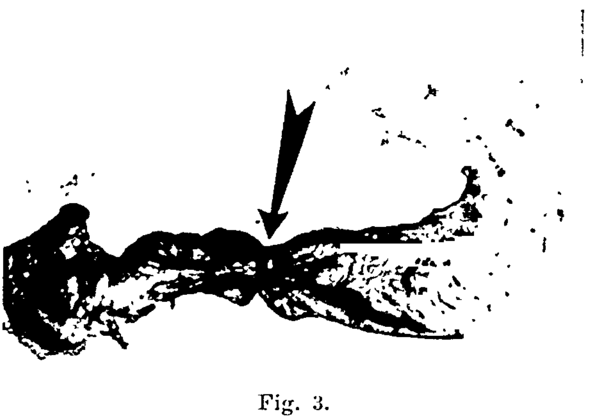

Fig. 3.

Fig. 3. Specimen of Case 2.

encountered in dissecting free the ileac glands, since in this region they were much enlarged and the mesentery was thickened The terminal 40 cm of ileum, together with the cecum, was resected, and an end to end ileocolostomy was constructed with the ascending colon The postoperative course was uneventful

Pathologic Examination The material consisted of a part of the ileum (50 cm in length) the cecum and a part of the ascending colon, together 20 cm long, including the appendix Grossly the ileum, the ileocecal valve and part of the cecum were hard, partly obliterated, and thickened, resembling an elephant's trunk The lumen was very narrow There were areas of necrosis in the mucosa, some of which penetrated deeply as ulcerated cicatricial scars Microscopically, just beneath the ulcerated and scarred areas there were infiltrations of eosinophils, polymorphonuclear neutrophils, rare giant cells and granulation tissue without caseation, as well as hypertrophied lymphoid tissue This inflammatory process involves the whole intestinal wall No acid fast organisms were seen

Diagnosis The diagnosis was regional ileitis (pathologist, Prof Dr Necati Eranil)

SUMMARY

Since interest in regional ileitis was aroused in Turkey, I have observed and operated on five patients in addition to the two cases reported in this paper

The most reliable diagnostic criteria were roentgenologic signs, but these were not always decisive In two of my previous series, laparotomy was performed because of suspected appendiceal abscess, but regional ileitis was discovered on exploration The belief that "ileitis causes diarrhea and appendicitis causes constipation" does not always hold true In some cases the diagnosis is made only on exploration As an example, the patient in one of my earliest cases, operated on in 1943, had had an appendectomy and some time later, because of suspected tuberculosis an anastomosis had been performed between the ileum and the transverse colon At the time the patient was first seen by me, this procedure had resulted in a fecal fistula at the site of the operation I resected between a point proximal to the previous anastomosis and the middle of the ascending colon, the specimen, on pathologic study, showed regional colitis

No patient in my series returned with a relapse

RIASSUNTO

L'A ha osservato ed operato altri 5 casi oltre i 2 illustrati tutti dopo che anche in Turchia e' sorto un rinnovato interesse per l'ileite regionale La diagnosi si basa specialmente su dati radiologici ma questi non sono sempre decisivi In due casi occorsi all'A la laparatomia era stata eseguita nel sospetto di un ascesso appendicolare, mentre venne riscontrata un'ileite regionale Il concetto che "l'ileite provoca diarrea, mentre l'appendicite stitichezza" non e' sempre esatto La diagnosi puo' essere fatta, talvolta, solo all'apertura dell'addome Ricorda per esempio un caso operato nel 1943, nel quale era stata eseguita dapprima un'appendicectomia poi, dopo un certo intervallo di tempo, un'anastomosi fra l'ileo ed il colon trasverso nel sospetto di una tubercolosi intestinale Quando l'A venne consultato, si era stabilita una fistola fecale nella zona dell'operazione Venne allora praticata una resezione, da un punto prossimale alla precedente anastomosi fino alla meta' del colon ascendente L'esame microscopico dimostro' una colite regionale

Nessuna recidiva e' occorsa nella serie dei casi operati dall'A

SUMARIO

Desde que ha habido interes en Turquia en el estudio de la ileitis regional, (sin contar los dos casos que ha sido reportados en este articulo) yo he observado y operado cinco casos adicionales

Los signos radiograficos, aunque no son siempre decidibles, son los de mayor valor en el diagnostico En dos casos previos la laparatomia se practico en la sospecha de la existencia de un abceso apendicial y que la exploracion probo ser la ileitis regional La creencia de que la ileitis causa diarrea y la apendicitis la constipacion no es siempre la verdad En ciertos casos el diagnostico solo se puede hacer por la exploracion abdominal Como ejemplo de lo ultimo, cito uno de mis casos que opere en 1943, este caso fue operado ant [illegible] pendicitis y se le practico

la apendectomia, mas tarde se le practico una ileo-colostomia (colon transverso) por sospecha de la existencia de una tuberculosis intestinal. Cuando yo vi al paciente por la primera vez el ya padecia de una fistula fecal en el sitio de la operacion. Yo practique una reseccion del segmento intestinal desde un punto proximal a la anastomosis previa hasta la porcion media del colon ascendente. El examen patologico del especimen demostro la ileitis regional.

Ninguno de los casos en toda mi serie ha sufrido relapso.

SOMMAIRE

L'intéret pour l'iléite régionale a été éveillé en Turquie et cela est dû à deux cas que je rapporte ici et à cinq autres opérés.

Les signes diagnostics les plus precieux nous sont fournis par les rayons "X" mais ils ne sont pas toujours décisifs. Dans les deux premiers, cas la laparotomie fut faite croyant avoir à faire à un abcès appendiculaire, l'iléíte régionale fut découverte à l'opération; l'iléite ne cause ni diarrheé, ni constipation. Dans certains cas, le diagnostic n'est fait que sur la table d'opération.

Dans un de mes premiers cas, opéré en 1943, le malade avait eu une appendectomie et peu de temps après, le diagnostic de tuberculose fut fait. Une anastomose avait été faite entre L'iléum et le côlon transverse Quand le malade fut vû par moi, ce procédé avait produit une fistule fécale au siège de l'opération. Je réséquai à un point rapproché de l'anastomose et du milieu du côlon ascendant. Le spécimen pathologique fut étudié et montra une colite régionale. Aucun cas dans ma serie n'eut de rechute.

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Vagotomy in the Treatment of Peptic Ulcer

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THE much disputed question, "When should the physician refer a patient with gastroduodenal ulcer to the surgeon?" seems to be definitely answered. Allen, in his lecture delivered in commemoration of Moynihan in London, 1947, declared that 10 percent of patients with duodenal ulcer can not be cured by conservative methods.

This 10 percent requires surgical intervention. Surgeons, however, for a long time could not agree as to whether anastomosis or resection was preferable. In 1919 and 1920, while I was at the Eiselsberg Clinic (situated in the Allgemeines Krankenhaus in Vienna) we almost always performed resection for gastric ulcer, whereas surgeons of the neighboring Hochenegg Clinic, operating within the area of the same hospital, performed anastomoses almost exclusively in similar cases.

The increased number of anastomotic jejunal ulcers and the recent progress in surgical technic have brought about an increase in the number of resections performed, both in Europe and overseas. Nevertheless, it was not long before the results of postoperative examination gave rise to world-wide dissatisfaction. Peptic jejunal ulcer appears after resections as well as after anastomoses; it forms repeatedly in the gastric stump, and a variety of difficulties and disorders appear in connection with evacuation of the stomach.

Haberer, an experienced surgeon and an acknowledged authority on the surgery of peptic ulcer, performed 3,153 resections for ulcer up to 1936. In 1938 he expressed the opinion that resection should be resorted to only until a better solution is found. On the basis of statistics, he estimates the primary mortality rate of resection at 2 to 15 percent. The percentage of unsatisfactory results after check-up examination he found to be 5 to 7 percent. He abandoned Finsterer's method of exclusion with resection, as five of 23 patients so treated died, and in four cases, peptic jejunal ulcer developed.

Allen, in the aforementioned lecture, gave an account of 196 cases of resection performed in the course of 10 years. Death occurred in four cases, or 2 percent. He expressed the opinion that ulcer occurs in 3 percent of cases after resection, and regards gastritis as the gravest of the undesirable sequelae of gastrectomy.

I performed 652 resections for gastric and duodenal ulcer during 33 years, 125 of them within the past three years. Six of the 125 patients died (4.7 percent). The immediate cause of death was operative shock in one case, pneumonia in two, paralytic ileus in one and uremia in one.

Only 82 persons reported for control examination, and in 19 instances the results were unsatisfactory. It is to be assumed that results in the majority of cases in which the patients failed to report for check-up examination were also bad.

A general survey of all these data inclines one to agree with Haberer, who expects progress in this surgical field from a new, more promising operation. It is no wonder that the first publications of Lester Dragstedt on bilateral subdiaphragmatic or supradiaphragmatic vagus resection, which appeared in 1943, have been received with great enthusiasm by the majority of surgeons.

Cure of peptic ulcer by division of the vagus branches at the lesser curvature of the stomach has long since been attempted by the Bircher, a Swiss surgeon, who was followed by Laterjet and others. These attempts, however, have been unsuccessful. Dragstedt's great merit lies in the fact that he pointed out that peptic ulcer can be cured only by total bilateral vagus dissection.

I began vagotomy operations in 1947, much encouraged by the physicians. During my visit to the United States, this was the problem I studied most intensively; it was also the main subject of discussion at the Congress of the International College of Surgeons held in

Chicago, 1947. Dragstedt on this occasion reported 250 cases of vagotomy. He avoids transthoracic approach for the same reason that led me to choose, from the beginning, the transabdominal subdiaphragmatic vagus resection; only this approach allows a proper view of the changes in the abdominal organs and makes an operation necessitated by some other disorder feasible.

I performed my first vagotomy July 9, 1947. Since that time I have performed it on 104 patients of whom 38 have come to clinical examination, among them nine with gastric ulcer, 22 with duodenal ulcer, two with gastric and duodenal ulcer and five with peptic jejunal ulcer. There was one mortality. I operated on a secondary jejunal ulcer that appeared after resection; the ulcer perforated on the third postoperative day, and the patient died of perforating peritonitis. During the operation the jejunal ulcer was not even touched. It can be taken for granted that this ulcer would have perforated regardless of whether vagotomy was undertaken. The pains subsided immediately after the operation in all 37 cases, and 34 of the patients remained constantly free of symptoms. Control examinations showed the results in 10 cases to be excellent, in nine good, in 10 satisfactory, in five poor and in three bad. By *excellent* results I mean immediate and lasting relief from the symptoms. *Good* results presuppose certain postoperative disorders in the evacuation of the stomach, which are transitory and will subside after a certain period. A *satisfactory* result is attained when any minor complaints that persist after the operation do not impair the patient's working capacity. Inability to work is considered a *poor* result, and a *bad* result must be admitted when the operation fails to eliminate the ulcer.

During the same period, 68 resections for ulcer have been performed at our clinic on patients who were not eligible for vagotomy. Control examinations in the latter cases have given far less satisfactory results than have examinations after vagotomy.

TECHNIC

The operation is performed by subdiaphragmal division of both vagi.

The left vagus passes along the anterior surface of the esophagus and reaches the abdominal cavity through the hiatus esophageus. It is clearly visible in the majority of cases on the anterior surface of the esophagus, and if the hiatus is widened with a finger it becomes taut like a cord and can be easily palpated.

The right vagus runs on the dorsal surface of the esophagus and extends to the abdominal cavity. It is usually thicker than the left one and can be easily detected if the esophagus is pulled aside, right or left.

The operation is performed with an upper median laparatomy with subumbilical elongation of the incision. After the abdominal cavity has been opened, the position of the ulcer is determined and a plan is made for the further course of the operation. If the pylorus has narrowed, anastomosis is indicated.

After exposure of the lower surface of the diaphragm and cardia, the triangular ligament is severed. The left lobe of the liver is lifted to the right, the parietal peritoneum covering the esophagus is incised and the esophagus is widened by finger. By this trick the esophagus can be mobilized and detracted so that about 8 to 10 cm. of its length is visible. This is followed by resection of a 3 to 4 cm. portion of the vagus nerve or, if the nerve is already divided into many branches, of the same portion of each small branch on the anterior surface of the esophagus. After this the esophagus is pulled with a hook to the right or left to give access to the right vagus nerve, from which a corresponding portion is resected. After division of the nerves, the parietal peritoneum covering the esophagus is sutured, and if the pylorus is narrowed I perform anastomosis as well. The operation may be performed with local anesthesia, which is almost always satisfactory.

Preoperative preparation and postoperative treatment are just as important as the operation itself. On the last day prior to the operation a Wangensteen suction apparatus is applied, and aspiration is carried out several times for relief of the stomach. If there is a decrease in the quantity and quality of gastric secretion as compared to preoperative conditions, the vagotomy is complete. Food intake is prohibited as long as the tube is in the stomach It is removed on the fourth postoperative day, and the patient receives 30 cc of fluid every hour

A day later the gastric contents are aspirated and if the stomach is empty the patient receives 60 cc of liquid each hour on the following day If this liquid is evacuated from the stomach the patient may eat strained food He is instructed to refrain from eating as soon as he feels pressure It is necessary to make him understand that success depends not only on the operation but on his cooperation, without which there will be postoperative distention of the stomach If extensive dilatation of the stomach does not take place in the postoperative period, the normal motor nerve function of the stomach is usually reestablished within six months

As to the indications of vagotomy I perform it (1) for duodenal ulcer in young patients when resection cannot be performed and exclusion with resection does not come into consideration, (2) in every case of jejunal ulcer developing after gastroenterostomy and resection, and (3) in certain cases of gastric ulcer

I formerly preferred resection for gastric ulcer of the lesser curvature for fear of cancerous degeneration of these ulcers Five months ago however I changed my opinion in connection with a particular case I intended to perform resection upon a 64 year old patient for a callous ulcer with large crater, located on lesser curvature After partial peeling of the greater curvature it became apparent that resection could not be performed, as the ulcer had already penetrated to the pancreas I decided on vagotomy The patient became free of symptoms immediately after the operation, and three months later a gastroscopic examination failed to reveal any sign of the ulcer and its large crater Ever since this incident occurred I have performed vagotomy for ulcer of the lesser curvature, controlling carefully and regularly the condition of the patient after operation

For ulcer localized in the vicinity of the cardia I determine its exact site by laparotomy and perform vagotomy by the transthoracic approach

From 104 vagus sections 38 were followed up since July 9, 1947 with very good results However final results can be reported and definite conclusions drawn only after the experience of many more years The immense advantage of vagotomy over resection will be evident in five to 10 years if during this time jejunal ulcer does not recur after the combined vagotomy and gastroenterostomy operations now being performed In the meantime, physicians and surgeons must cooperate in the intensive study of vagotomy This should eventually solve the problem as to whether vagotomy brings us nearer to the ideal surgical treatment of medically incurable peptic ulcer

SUMMARY

Since gastroduodenal peptic ulcer requires surgical intervention in 10 to 25 percent of cases, and the end results of anastomosis and resection over a prolonged period are not always entirely satisfactory it is suggested that vagotomy may be the procedure of choice when no definite contraindications exist The author encouraged by the example of Dragstedt, has performed transabdominal subdiaphragmatic vagus resection on 104 patients with gastric, gastroduodenal, duodenal or jejunal peptic ulcer, there was one mortality connected with the operation Pain subsided immediately, and nearly all the patients remained entirely symptom free The end results in 41 cases in which resection was done because the patients were not suitable subjects for vagotomy were far less satisfactory The author's technic is explained in detail

RIASSUNTO

Dato che le ulceri gastro duodenali richiedono nel 10 25% un'intervento operativo e dato che i risultati dell'anastomosis della resezione non sono completamente soddisfacenti, l'A ritiene che la vagotomia rappresenti la cura di elezione all'orquando non esistono particolari controindicazioni L'A ha eseguito 104 vagotomie per ulceri gastriche, gastro duodenali duodenali e del digiuno, senza mortalita' operatoria I dolori sono cessati quasi immediatamente e quasi tutti i pazienti non hanno piu accusato disturbi

Risultati molto meno soddisfacenti sono

stati ottenuto in 41 casi operati di resezione perche' ritenuti non adatti per la vagotomia.

SUMARIO

De 10 a 25% de los casos de ulcera peptica requieren la intervencion quirurjica. Sin embargo, los resultados de la anastomosis y de la reseccion, en un periodo prolongado, no son siempre satisfactorios. Por lo tanto se sugiere la vagotomia como el procedimiento de seleccion, cuando no hayan contra-indicaciones para su empleo. El autor siguiendo el ejemplo de Dragstedt, ha practicado la vagotomia transabdominal por la ruta subdiafragmatica en 64 pacientes. No hubo mortalidad en coneccion con la operacion el dolor desaparecion casi inmediatamente y la gran mayoria de los pacientes estan libres de todo sintoma. En cambio los resultados en 41 pacientes en que se practico la reseccion no han sido tan satisfactorios.

SOMMAIRE

Vu que L'ulcère peptique gastroduodénal nécessite une intervention chirurgicale dans 10 à 25% des cas, et que les résultats ultimes de l'anatomose et de la résection ne sont pas toujours satisfaisants, l'auteur suggère que la vagotomie est peut être le procedé de choix lorsqu' aucune contre indication existe. L'auteur, encouragé par les résultats obtenus fit Dragstedt, une résection sousdiaphragmatique du vagus dans 104 malades souffrant d'ulcère gastrique gastroduodénal, duodénal ou jejunal. Il n'y eut aucun décès. Dans 41 cas de résections, les résultats furent moins satisfaisants, vu que les malades n'étaient pas dans une condition favorable pour la vagotomie.

Surgical Construction of Rectovesical Fistula

A New Technic: Report of Three Cases

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A NEW technic has been devised for the surgical creation of a rectovesical fistula in the treatment of certain urologic conditions, notably vesical extrophia, epispadias with incontinence of urine, wide destruction of the urethra (traumatic) and postoperative hypertrophy of the prostate in patients whose condition does not permit a second operation for final extirpation of the gland. Thus far the results are promising. Before discussing the technic of this procedure, certain anatomic, anatomopathologic and physiologic considerations are pertinent.

1. Since it is possible to live for many years with a rectovesical fistula and since many children with extrophia of the bladder die in a short time as a result of ascending infection, the creation of a rectovesical fistula is preferable to nonintervention. Coffey's method cannot be used directly in operating on children, because the posterior wall of the urinary bladder is open and may become infected.

2. When, because of traumatic or infectious conditions, it is impossible to create a plastic urinary canal, a fistula can be made in the hypogastric region or at the perineal or the scrotal level.

3. Many patients with hypertrophy of the prostate who have undergone one operation are compelled to carry urinal receptacles all their lives because their poor general health does not permit secondary surgical intervention for removal of the prostate. For these patients also, Coffey's operation is impossible.

4. Although the Coffey procedure is difficult, it must be used for vesicovaginal fistula in women. For the male patient it is not necessary, since the rectum is in contact with the urinary bladder. In a patient with a continent sphincter ani, a good result like the one obtained by Coffey's method can be obtained by creating an oblique postero-anterior vesicorectal fistula. Ascending infection from the rectum is a possibility, but in the new procedure there is less chance of its occurring. In Coffey's method the ureters are separated upward at their point of juncture in the urinary bladder and opened to the aforementioned organs after passing through the wall of the rectum and that of the sigmoid respectively at different levels. Separation of the ureters requires sacrifice of their terminal muscles, which might otherwise be made to act as sphincters. Even with the most careful separation it is impossible to make sure of their living where they are implanted. In the procedure to be described, this difficulty is eliminated by the fact that the ureters are not separated.

5. When an organ is inactive it shrinks, eventually becoming completely atrophied. After the new procedure the urinary bladder assumes the shape of a small bassinet.

6. It should be remembered that the peristaltic movements of the rectum occur from above downward, becoming reversed (antiperistaltic) only after defecation.

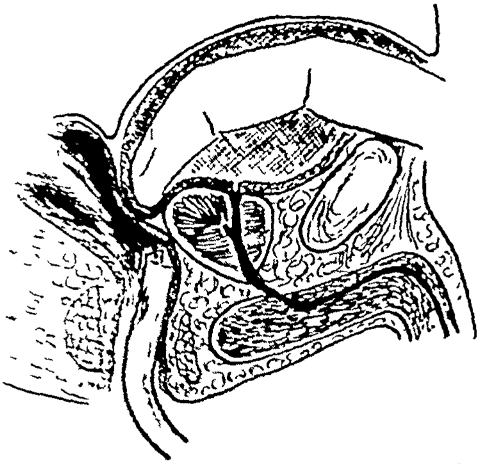
The operation to be described represents, I believe, a sound means of overcoming these difficulties. With slight variations, it is adaptable to vesical extrophia, epispadias accompanied by incontinence of urine, postoperative prostatic hypertrophy coupled with a state of health that does not permit final removal of the gland, and widespread destruction of the urethra as a result of violent trauma, making a plastic operation impossible.

TECHNIC

The patient is prepared as for any other operation, except that he is given a constipating medicine after a lavage. Operation should be done on the day following these preparations.

Vesical Extrophia.—The urinary bladder is opened, and the surgeon's right index finger is introduced from the lowermost point on the right exerting strong pressure toward the gradually to the shape of a small bassinet. The chances of ascending infection are slighter, therefore, than after Coffey's operation.

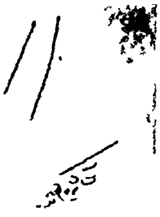
Epispadias with Incontinence of Urine: For this condition the operation is performed



[illegible] large curved trocar is introduced into the [illegible] thrust extraperitoneally in the direction [illegible] into the bladder and thus the two sides are perforated.

[illegible] enlarged urethra to the urinary [illegible] the rectum as previously de-

[illegible] *Destruction of the Urethra:* [illegible] is so extensive as to



[illegible] bladder [illegible] the movements [illegible] eventually infect the lower [illegible] constructed by the operation, but [illegible] by the sterile urine from t[illegible] procedure the [illegible] which can serve as [illegible] and the urinary bladder.

[illegible] ace in [illegible] ble [illegible] is make a plastic operation impossible, a cystotomy is performed, after which the anterior wall of the urinary bladder is closed.

Postoperative Hypertrophy of the Prostate: When a second operation for extirpation of the prostate is impossible because of the patient's poor general health, a rectovesical fistula should be created through the point of cystotomy. When the fistula on the anterior wall of the urinary bladder is closed, a daily lavage with an antiseptic solution should be given through the sound in the fistula, the lower end of which emerges from the rectum. The sound is removed when the fistula in the anterior vesical wall is closed

CASE REPORTS

Case 1: The patient, a man aged 70, had urinary difficulty of five years' duration. The urine came drop by drop, causing him sharp pain. He was cathectic and hyperpyrexic, his temperature ranging from 37 to 38 degrees centigrade. The urine was turbid and contained an abnormal number of leukocytes. There was no lesion in either kidney. Bilateral cachectic edema, affected the legs, extending as far as the knees. There was hypertrophy of the prostate with stone and diverticula extending to the posterior aspect of the prostate.

Operation had been refused by urologists because of the patient's poor condition. At his urgent request, a cystotomy was performed with the patient under local anesthesia. A fortnight later the general health was noticeably improved. The temperature was normal and the cachectic edema had decreased.

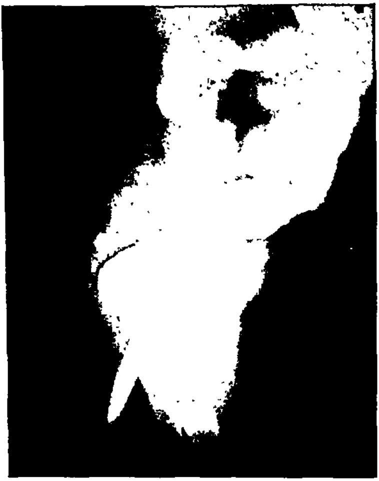


Fig. 4. A frontal radiogram of the patient with a periprostatic phlegmon spread on the scrotum and the penis. After the new operation a lavage with a dilute solution of barium was given. It is clearly seen that the fistula and the bladder are not filled with the barium solution.

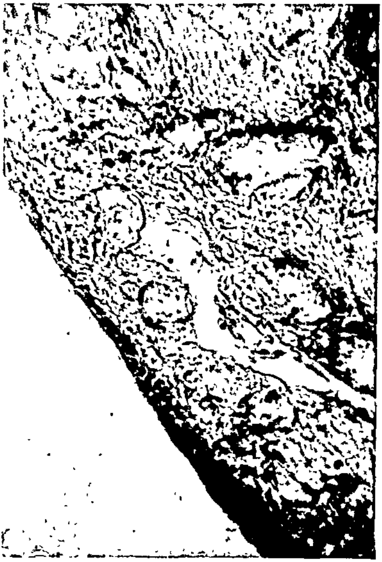


Fig. 5. A longitudinal cross-section of the vesicorectal canal of the premature child (Case 2). Thus the new epitelization is seen.

Because of the prostatic hypertrophy with stone and diverticula a urologist was invited to attend the second procedure. Seeing that the patient's health had improved, he consented to perform the operation. In order to determine toleration, he introduced a thin silk sound into the urethra. On the following day the patient's temperature rose to 39 degrees. In spite of massive injections of penicillin and streptomycin, this fe[illegible] [illegible]rsis[illegible] for three months. It was not possible to perform the second operation.

On examination the stone in the prostate during the cystotomy, when the urinary bladder was full of liquid, had proved to be pointed at either end, one point being directed toward the urinary bladder and the other toward the rectum, and of a size to suggest that the prostate had actually been transformed into a stone with two points. Operation being obviously impossible, it was decided to employ daily massage and pressure through the rectum to cause perforation (by the pointed stone) of the walls of these organs, causing the stone to escape into the organ and at the same time creating the fistula which could not be obtained by surgical measures. After every massage the patient's temperature decreased for six or seven hours, later returning to the higher level. After the fistula had been formed, however, the temperature became normal again, and medical treatment improved the cachectic state. At the time of writing, more than a year later, the patient is living normally, with a functioning rectovesical fistula, although his urethra is obliterated and gives passage only to two or three drops of urine.

Case 2: M. A., an eight-month premature boy 9 days old, 42 cm. long and weighing 1,500 Kg., showed congenital vesical extrophia, dehydration and atrepsia. A rectovesical fistula was created by the surgical procedure already explained, and the wall of the urinary bladder was closed by a plastic procedure. The child was given daily injections of 60 cc. of physiologic serum and 20,000 units of penicillin every three hours. His condition showed improvement, and after a week the sutures were removed. Although the operative wound was closed, a small opening was visible. The rectovesical fistula, nevertheless, was functionally active. On the day following removal of the sutures the child had a temperature of 35.8 C. A day later it was 37.2 C., and there was an increase in the pulse rate. The general condition became worse; there were two episodes of angiosis and cyanosis. In the evening the child did not take his bottle. Examination of the lungs revealed signs of bronchopneumonia. At 9 p.m. the child died.

Autopsy revealed the following picture:

1. The lips, hands and feet were cyanotic.
2. There were signs of bronchopneumonia in both lungs.
3. All cavities of the heart were dilated. The oval hole was closed. There was incipient organization in the ductus Botallis.
4. The stomach and intestines showed uremic inflammation (catarrhal). There was dark pigmentation, with turbid swelling and many foci of fatty degeneration.
5. The spleen was tough and swollen and showed parenchymal hyperemia.
6. The kidneys were embryonic, lobular and hyperemic. The renal pelves and the calices were dilated. On Malpighi's pyramids many stones of uric acid were observed. There was bilateral pyelonephritis. Both ureters were dilated.
7. The anterior wall of the urinary bladder was closed, and a small fistula could be seen.
8. The other organs were normal.

Microscopic examination confirmed these observations.

Case 3: The patient, O. A., a 4-year-old boy, was almost cachectic, with hypogastric fistulas and penal and scrotal inflammation. His temperature varied from 37 to 38 degrees Centigrade. His general condition was toxic and alarming; for this reason he had been refused admission to any urologic clinic. During examination the hypogastric fistula was dilated with Cocher forceps, and there was a flood of blood and pus. The urinary bladder was also dilated. Palpation of the prostatic region by the rectovesical route revealed it to be tough and swollen in a manner suggesting the presence of a tumor the size of a mandarin orange. A week later, after treatment with penicillin and sulfamesatine, a scrotal swelling was observed which presented the form of a phlegmon. Subsequently a vast destruction of the urethra was seen extending from the scrotum to the prostatic region. This fistula closed slowly, and the patient could not urinate in the normal way. The urine was expelled by the hypogastric fistula, but the fever nevertheless continued. It became necessary to construct a rectovesical fistula.

A week later the temperature became normal and the general condition gradually improved. At the end of a fortnight the hypogastric fistula was closed and the urine was expelled by the artificial rectovesical fistula. At the time of writing, two months later, the child is living almost normally, except that defecation occurs three or four times daily.

SUMMARY

Three cases are reported, with successful results in two. In the other (Case 2) the condition of the patient, a premature infant, was so poor as to obviate the saving of life. Even in this case, however, the artificial fistula functioned well until death supervened. The new procedure herein described, providing as it does a means of avoiding certain drawbacks that attended earlier operations, seems likely to save or lengthen the lives of many patients.

RIASSUNTO

Su tre casi operati, sue hanno avuto un esito soddisfacente Nel terzo caso le condizioni del bambino prematuro erano talmente gravi, da spiegare di per sè le ragioni dell'insuccesso, ma anche in questo caso la fistola praticata artificialmente ha funzionato bene fino all'ultimo La nuova tecnica proposta dall'A sembra salvare, o almeno, prolungare la vita di molti pazienti, senza avere gli inconvenienti di altri metodi operatori

SUMARIO

Se reportan tres casos, de los cuales, dos tuvieron muy buenos resultados En el otro caso (caso # 2) la salud del infante prematuro fue tan pobre que se puede desir fue desde el principio un caso ya perdido Sin embargo la fistula artificial en este caso funciono muy bien hasta el momento de la muerte Este nuevo procedimiento, descrito en este articulo, elimina ciertas de las dificultades de otras operaciones y tiene la ventaja de aumentar las posibilidades de salvar la vida del paciente y por lo menos prolongarla

SOMMAIRE

Trois cas sont rapportes Les résultats furent excellents dans deux des cas Dans L'autre cas, un enfant prématuré, son état était si mauvais qu'on ne pu pas le sauver Mais dans ce cas, une fistule artificielle fonctionna jusqu'a la mort

La procédure décrite ici nous permet d'éviter certains désavantages qui accompagnent les opérations primitives et elle parait prolonger la vie de beaucoup de malades

NOVEMBER 10, 1949

ASSEMBLY BANQUET

Carolina Room, Chalfonte-Haddon Hotel, Atlantic City—7:30 P.M.

Custis Lee Hall, M D, F A C S, F I C S, Washington, D C, Presiding

SPEAKERS

His Excellency, The Ambassador of Australia to the United States, Mr Norman Makin

Prof Percival Templeton Crymble, F R C S, Chief of the Department of Surgery, Queen's University, Belfast, Ireland

(For reservations please contact Chester W Trowbridge, M D Chairman Banquet Committee
1516 Lake Shore Drive, Chicago 10 Illinois)

Podological Surgery

A. WALLET, M.D.
PARIS, FRANCE

FOLLOWING Professor Laignel-Lavastine's advice given years ago in his inaugural address, I have tried to open a small path in the large forest of medicine—that of podological surgery.

Podological surgery is the surgery which relieves the diseases and the painful deformities of the forefoot. It is quite different from orthopedic surgery of the foot, which is well known and has been thoroughly studied, and which cures the flat foot, the club foot, the hollow foot, and paralytic deformities of the forefoot.

Podological surgery brings total and definite relief to all those minor but painful diseases of the forefoot, which, without threatening one's life, make it nevertheless intolerable. This new relief, I believe, has realized the ideal of Sydenham who said that if someone would spend all his life studying only one question, and would only discover how to cure corns, he would for that one thing deserve well of humanity.

In fact, podological surgery is essentially, and above all, the surgery of pain. Some people, insufficiently informed or perhaps ill-disposed, seem to consider it as a branch of plastic surgery. This is untrue. Corns, callus, hammer-toes, valgus, are painful to people of every social standing, and cause the loss, each year, of a large number of working days.

It is not easy to prevent or to cure these diseases. They are not caused by ligamental or tendinous tightenings or by rheumatism, as most people would like to believe. These affections frequently attack people who honestly try to get the best fitting shoes, but whose feet do not adapt themselves to the commercial pattern.

These diseases are difficult to deal with, as they are due to secondary mechanical considerations based on the leverage of the phalanges among themselves or on the metatarsal bones. If they really heal, it is never by medical treatment or with the excision of soft tissues, but, on the contrary, by the resection of the shaft of the bone which causes compression in the shoe.

To illustrate the results of my studies of painful diseases of the forefoot, we must first study the human foot that has never been in a shoe, and note what lesions we may find.

In so doing, we find flat feet, rheumatism and cutaneous diseases, but never hallux valgus, hammer-toe, corn or callus. We find a "foot in fan," and a thick painless plantar layer used as a sole by the bare foot.

Ancient civilizations show us sculptures and paintings that provide models of feet when people walked barefooted, or when fashionable shoes were loosely adapted to the shape of the feet, which are like those of the savage or of the small child.

In periods of advanced civilization, when fashion prevailed, when sandals and shoes compressed the foot, the latter underwent characteristic deformations according to the construction of the shoe which had moulded it and the period at which the statue or painting was made.

To those, not much inclined to philosophical or historical demonstrations, who think that the foot cannot be easily deformed by the shoe, let me recall the deformities made with simple ribbons on the feet of Chinese women. It is evident that shoes made of hard leather and handed on from one child to another in modern families are just as apt to deform the foot as any strip of cloth.

In good faith deformities of the forefoot can therefore be considered as caused by shoes. Their symptomatology being known to all, and their diagnosis easy to make, how shall we tackle the treatment?

Obviously, reducible deformities must be distinguished from irreducible.

A. Reducible Deformities: For reducible deformities we do our best to restore the foot to its normal shape, using medical and orthopedic measures. The single obstacle is that the deformed foot usually has quite a different shape from that of the ready-made shoe It therefore requires a shoe of a particular and rational shape, but will the patient be willing to wear such a shoe when he no longer suffers?

The question of the shoes being solved and the patient afflicted with slight deformities having agreed to wear all his life a shoe which is adapted to the shape of his foot, we shall ask him to have the will power and tenacity to make all the movements necessary to reeducate his foot

B Irreducible Deformities The treatment is evidently quite different Here we find hallux valgus, hammer toes with ruptured ligaments eroded cartilages in which bones have already undergone osteoporosis, and whose superficial points of compression are covered with inflammatory serous bursae with painful hygromas

These affections evidently cannot be cured by medical or orthopedic methods, their evolution as a form of traumatic arthritis is progressive

To relieve the diseases the *cause*, and not the effects, must be found We must be certain that not only a good local surgical result will be obtained, but also, as Leriche said a good general therapeutic result allowing the patient to use his feet again and to walk with ease in ready made shoes

Up to now, however, what have been the aims of treatments given to cure deformities of the forefoot and painful hygromas which surround them? We answer without hesitating that all who were concerned with them, doctors druggists, chiropodists never looked for anything but the effect—never for the cause

After the failure of every treatment, the unfortunate patient comes to the surgeon unhappy and impatient asking for a radical cure that will bring him back to normal once and for all He is so tired of suffering that he often asks for amputation If the fifth toe is concerned, amputation is often performed, though it is therapeutically bad If it is a big toe, then one of the numerous classic surgical technics will be proposed to correct the hallux valgus

Here we must thoroughly understand the function of the lever in order to understand the reasons which favor one procedure or the other

As long as one does not prevent, by shortening the longitudinal axis of a toe the pressure exerted on its tip to make one of its articulations protrude, one has not realized a good therapeutic result, and the shoe will distort again what one has tried to rehabilitate, this explains failures following treatments with tendinous grafts narrow resection, ankylosis, removal of soft tissues etc

Good therapeutic results in arthroplastic operations on one of the five axes of the foot for instance the cure of a hallux valgus requires not only immediate surgical success but also careful consideration of the consequences of the shortening of one of the longitudinal axes of the foot in relation to the others

It is absolutely necessary for the arthroplastic surgeon to make sure that the shortening of the shaft will not harm the normal equilibrium of the foot

It is obvious that the resection of the first metatarsal head in the cure of hallux valgus will surely cause a painful claw of the second and third toes

The surgical shortening of four deformed toes, for instance, without touching the healthy fifth one, will unfailingly cause a deformity of the latter which, conserving its normal length, will approximate alone against the tip of the shoe Here again, as much in the length of the toes as in their retraction in claw, multiple surgical problems arise, and they will not be solved unless each particular case is studied

However, it it is desirable that physicians and surgeons know the few operations giving good results for one particular toe, it would appear that the problem of equalization of lengths and compressions in multiple surgery will continue to be the field of specialists

The difficulty of realizing the minute arthroplastics of podological surgery can be best stated by quoting Putti

"I consider arthroplasty as one of the most complete expressions of surgical art, and necessitating the highest surgical skill. It would be wrong to awaken the enthusiasm, if it engaged those who have not the required skill and equipment to practice such an intervention, in an offhand way, and believing in an easy success.

"I believe after all that it is a good thing that this method gives rise to doubt and scepticism, and that its entering current surgery is slow. It is better that it stays in well-trained hands in orthopedic surgery, than to see it received with an easy enthusiasm by those who couldn't use it without discrediting it, or worse, crippling the patients.

"The most operative treatment is as important as the care with which the operation must be performed.

"No wonder that the best general surgeon doesn't obtain with arthroplastic the results others get, when, after having realized the intervention with a perfect technic, he abandons his patient to a listless assistant in a hospital deprived of the necessary organization to carry out proper postoperative treatment.

"As in so many other surgical methods, arthroplastis gives rise to a problem of organization and specialization: it will give complete satisfaction only to those who will learn to understand and solve this problem."

The kinetotherapy must be started about 15 days after the operation, when the patient gets up. It will last two or three months, with visits twice a week.

During the first visits there are included physiological massages of the veins and lymphatic systems, helping the resorption of edema in order to leave in the tissues no pathological effusion.

The second part of the kinetotherapeutic treatment is the most important: its object is the "creation" of a neoarthrosis, its functional adaptation to its continuation from the morphological points of view and its orthopedic dressing.

The passive mobilization of these small articulations is very delicate, and must be both methodical and prudent.

The passive and continued mobilization of the neoarthrosis causes the development of a serous bursa, which makes the movements of the joint easier.

In the beginning, the neoarthroses are not exactly fixed. The tendency to displacements must be counteracted by dressings made like plasters, executed with extreme care, that will maintain the axes of the foot in good position. Later the dressings are replaced by elastic dressings, the patient wearing sandals or postoperative square-tipped shoes, whose inner borders are exactly in line.

This general résumé on podological surgery may seem long for such a narrow surgical specialty, but, in conclusion, we believe it appropriate to quote Leriche, who, speaking about sympathetic surgery, and of its results sometimes upset by general surgeons, said: "They are operations which must have been learned, and this kind of surgery cannot be improvised by anybody."

RIASSUNTO

La chirurgia podologica è essenzialmente ed anzi tutto una chirurgia del dolore: è codesta chirurgia a guarire le malattie e le deformazioni dolorose dell'avampiede, dovute all'uso della scarpa presso gli unomini civili.

Essa è del tutto diversa dalla chirurgia ortopedica del piede, insegnata attualmente.

Essa ha per base una serie di artroplastiche minuscole delle articolazioni del metatarso con la falange e dell'interfalange dei cinque assi del piede, secondo un piano generale che rispetta gli appoggi normali.

Sono operazioni che è necessario imparare, e codesta chirurgia non è di quelle che chiunque possa improvvisare.

L'autore mette in guardia contro la loro semplicità apparente e si vieta di consigliarli ai propri colleghi, se cio' debba trascinar quanti non abbiano le necessarie attitudini, o non dispongano dei mezzi materiali occorrenti, a metter in pratica tali interventi alla leggera, senza discernimento e con la convinzione di un facile successo.

SUMARIO

Es la cirugía podológica, esencialmente y ante todo, una cirugía del dolor: es la que cura las enfermedades y deformaciones dolorosas del empeine, motivadas por el uso del calzado por el hombre civilizado.

Es totalmente diferente de al cirugía ortopédica del pie que se enseña en la actualidad.

Tiene por base una serie de artroplastias minúsculas de las articulaciones metatarso-

falangianas e interfalangianas de los cinco ejes del pie, conforme a un plan general que respeta los sostenes normales

Estas son operaciones que es necesario aprender, no siendo esta cirugía de las que cualquiera pueda improvisar

El autor pone en guardia a sus colegas contra la aparente sencillez de las mismas, excusandose de aconsejarselas a los que, faltos de las aptitudes requeridas o que no dispusieran de los medios materiales adecuados, pudieran verse incitados a practicar a la ligera semejantes intervenciones, sin discernimiento y convencidos de un facil exito

NOVEMBER 11, 1949

CONVOCATION OF THE COLLEGE

Warner Theater, Atlantic City

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Professor of Surgery, University of Vienna

Relief of Pain by Section of the Spinothalamic Tract at the Level of the Olivary Nucleus

ROLAND KLEMME, M.D., F.A.C.S., F.I.C.S.
ST. LOUIS, MO.

CHORDOTOMY, first performed by Martin in 1911 for the relief of pain, was actually introduced by Spiller in 1904. By his brilliant clinical observations that year (confirmed by autopsy in 1905), Spiller proved that the transmission of pain and fever occurs via the anterolateral tract of the spinal cord. Schuller of Vienna, on purely theoretical grounds, suggested section of the anterolateral tract for gastric crises, but credit is due to Spiller for this merciful operation. The first operative results were reported in 1912.

Numerous sections of the anterolateral tract for relief of pain, carried out since, have only emphasized the value of the procedure. In spite of many favorable reports, the operation is still a somewhat neglected one. Although it is usually done at the third and fourth dorsal segments, it can be done higher, and successful sections have been reported as high as the first cervical segment (Peet and others).

Section of the anterolateral tract has for some time been accepted by the neurosurgeon as a practical and merciful procedure. The possibilities are still not as widely appreciated as they should be by the medical profession at large. Many patients, harassed by pain, could be given early relief by this treatment, and at the same time the use of narcotics would be noticeably reduced or even completely omitted.

Only recently, in 1941, Schwartz suggested and carried out a tractotomy of the spinothalamic tract in the medulla oblongata. This procedure facilitated the relief of intractable pain distributed over the shoulder and neck via routes that cannot be interrupted by chordotomy. In many cases, extensive resection of the posterior cervical sensory roots and the resultant sacrifice of a useful arm fails to relieve the patient; spinothalamic tractotomy at the level of the olivary nucleus, on the other hand, does offer relief.

Dogliotti interrupted the tract at the point where the trochlear nerve roots are given off. Section of the spinothalamic tract at a lower level, as suggested by Schwartz, seems to be a more practical procedure.

White, in a comprehensive article, demonstrated and confirmed the advantages, discussing the anatomic relation of the spinothalamic tract to the adjacent tissue at various levels. The landmarks for cutting the spinothalamic tract are as well defined in the medulla as in the spinal cord and offer no greater difficulty or danger. Section of the spinothalamic tract in the medulla abolishes pain as high as the first cervical segment.

A topical arrangement of fibers within the cord was suggested by Foerster and Gagel. With minor modifications this arrangement has been accepted by Hyndman, van Epps and Walker. Further study is required for full understanding of the anatomic picture.

With full cooperation from the patient, the operation can be done with local anesthesia. A linear suboccipital incision is made; a segment of the occipital bone about the size of a quarter is removed; the dura is opened, and spinal fluid is evacuated from the cisterna magna. The cerebellar hemisphere is retracted upward and mesially. The ninth, 10th and 11th cranial nerves are identified. The posterior inferior cerebellar artery and the bulbar portion of the spinal accessory nerve are exposed. The rostral part of the inferior olivary eminence is identified, and an incision about three mm. deep is made just ventral to the point of emergence of the 11th cranial nerve, as suggested by White.

With the cooperation of the patient, an assistant does a sensory examination. All necessary fibers can be accurately separated, the vagus rootlets and the olive serving as landmarks.

If the incision is progressively deepened, the patient usually volunteers the information that the severe pain is entirely gone.

Schwartz and White reported that their patients had "loss of tickling sensation and loss of pain." The spinothalamic tract lies between the vagal rootlets emerging from the posterior lateral sulcus and the inferior olive. Section immediately cephalad to the 11th nerve, as proposed by White in 1941, was carried out on all patients. The resulting changes are similar to those following chordotomy. The use of local anesthesia facilitates accuracy and thoroughness. In this procedure its effectiveness depends largely upon the temperament of the surgeon and as the psychologic make-up of the patient.

CASE REPORTS

Case 1. M. H., age 43. The patient had intractable pain in his shoulders, arms and back for more than three years. On Oct. 6, 1941, a bilateral spinothalamic tractotomy was done in the medulla. The patient was completely relieved of pain and tickling sensation. There were no residual symptoms. This, I believe, was the first bilateral spinothalamic tractotomy ever carried out in the medulla.

Case 2. M. H., age 46. Unilateral. Pain was evident[4] in the right hand and the right side of the chest after removal of a spinal cord tumor five years previously. Tractotomy on June 2, 1947, gave complete relief of pain.

Case 3. C. M., age 63. Unilateral. There were severe lancinating pains in the chest and abdomen on the right side, with malignant disease of the bowels and metastases to the chest on the right. Tractotomy at the level of the medulla was done Jan 30, 1947 Complete relief of pain resulted.

Case 4. G. M, age 40. Unilateral. There was severe pain in the left arm. The patient had had scalenus section done elsewhere. Spinothalamic tractotomy in the medulla was done Dec. 12, 1947. Complete relief of pain resulted.

Case 5. A. S, age 40. Unilateral. There was intractable pain in the amputated stump of the left arm. On Nov. 13, 1945, spinothalamic tractotomy was done at the level of the olivary nucleus, with complete relief of pain.

Case 6. L. R., age 49. Unilateral. Intractable pain occurred in the amputated stump of the right arm. Spinothalamic tractotomy was performed May 5, 1945, in the medulla. Complete relief of pain resulted.

Case 7. V. W., age 49. Unilateral. There was causalgia in the right arm and hand, following trauma. On Nov. 22, 1947, a spinothalamic tractotomy was done in the medulla. Complete relief of pain was obtained.

Case 8. I. B, age 49. Unilateral. There was carcinoma of the lung, with pain in the left shoulder and in the neck. Spinothalamic tractotomy was done on Nov. 21, 1947. There was complete relief of pain except over the fifth cervical dermatome on the left. This was relieved by injections.

Case 9. A. F., age 42. Unilateral. There was intractable pain in the right arm and shoulder (metastatic carcinoma). Spinothalamic tractotomy was done in the medulla in October 1947, with complete relief.

SUMMARY

Spinothalamic tractotomy was done with a local anesthetic by the technic suggested by Schwartz (1941) at the level proposed by White in the same year. The operative risk was practically nil, the period of hospitalization only six days, and the results gratifyingly successful. The use of narcotics has been discontinued by all the patients.

RIASSUNTO

La tractotomia spinotalamica, come suggerisce Schwartz, (1941) facilita il sollievo da dolore intrattabile fino all'altezza del primo segmento cervicale. I punti principali per agliare il trotto spinotalamico sono cosi ben definiti tanto neli dollé che nella corda spinale. L'incisione di 3 mm. circa é fatta ventrale al punto di emergenza dell'undicesimo nervo del cranio. Rischio dell'operazione praticamente nullo. Il procedimento é fatto in anestesia locale per assicurare migliore accuratezza. Una sezzione bilaterale spinotalamica ed otto sezioni unilaterali vengono riportati.

SOMMAIRE

La tractotomie spinothalamique dans la Moelle comme l'a suggéré Schwartz en 1941 facilite la guérison de la douleur intraitable jusqu 'à la hauteur du premier segment cérébral Les points servant à couper la région du tractus spinothalamique sont aussi bien définis dans la Moelle que dans la colonne vertébrale. L'incision de 3 mm. de profondeur est faite à la partie ventrale au point où apparait l'onzième nerf cranien. Les risques de l'operation sont pratiquement nuls. Le procédé est effectué sous une anesthésie

local de façon à obtenir une meilleure précision. Une section bilatérale spinothalamique et huit sections unilaterales se produisent. Tous les patients sont guérias de leur douleur et toutes les drogues sont subséquemment eliminées.

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Owing to the limitation of space we have been unable to present all of the articles read at Rome International Assembly. The remaining papers will appear in our next issue.

Surgical Treatment of Gastrocolic Ptosis

CHARLES MIRALLIE, M D , F I C S , AND MARC LERAT, M D
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IN A study of the classic literature on the treatment of gastrocolic ptosis, one is struck by the very slight attention given by gastro enterologists to surgical treatment Authors as competent as Chiray and Chene (Paris) do not hesitate to deny practically all surgical indications Yet numerous works in France as well as in other countries have described various technics, either for suspending the stomach by its greater or lesser curvature (Lambret, Lille) or for directly suspending the transverse part of the colon (Coffey)

Since 1936 we have studied these problems with special care and have come to the conclusion that surgical treatment should be used much more In many cases it is definitely indicated and we have obtained results that strengthen our opinion

We do not intend, in this short article, to give a general survey of gastrocolic ptosis, we wish only to give a few personal points of view and to describe our own technic Therefore we shall avoid all etiologic and pathogenic discussion and limit ourselves to the clinical roentgenologic and therapeutic aspects of the question

A first point seems evident to us In the syndrome usually described as gastric ptosis the essential element is not the "falling" of the stomach (which is in reality, but a lengthening—often considerable—of the vertical position) but ptosis of the transverse colon, which is often lengthened and distended We propose, therefore, the term *gastrocolic ptosis*

Almost all patients with gastrocolic ptosis offer the same clinical aspect Most often they are female (5 women to 1 man) As a rule they are tall, thin and narrow chested, with oblique ribs and often a narrow waist, perhaps crushed by too tight a belt or by stays They always complain of physical and psychic asthenia, sometimes so severe as to cause them to forsake all activity

I remember a patient who had been obliged to resign her position as a stenographer. Another, the wife of a military policeman, was carried to the hospital in her husband's arms, as she was no longer able to stand The sisters of the nursing home mistook her for a little girl, she weighed only 33 Kg This loss of weight is the second symptom It almost always exists and may reach 10, 15, or even 20 Kg

The associated pain is of different types Sometimes it is a simple, vague and generalized pain, with uneasiness and heaviness of the epigastric zone, increased by eating In six of our patients we noted a sore spot, located at the level of the apophysis of the fifth or sixth dorsal vertebra, percussion of which caused exquisite pain All pains associated with this condition are increased by eating and soothed by lying on the back These facts are of the greatest importance

Constipation is the general rule, three patients out of four are constipated, the condition being obstinate and rarely improved by therapy In only six cases have we noted crises of pseudo diarrhea alternating with constipation

Clinical examination of these patients revealed only vague pains in the epigastric or the colic zone (often both) One symptom seemed constant · deformity of the abdomen, which was flattened and hollowed in the supra-umbilical portion and prominent in the sub-umbilical zone

We generally use the following technic, which rarely fails Standing behind the patient, with hands crossed on his hypogastrium, the surgeon exerts a slight pressure from bottom to top, bringing up the visceral mass, this usually causes an indisputable sensation of relief (an argument which the corset makers do not fail to plead in selling their products!) If the pressure is suddenly discontinued, the falling down of the bowels, pulling on the mesentery, causes a violent pain in the epigastric zone, sometimes even sufficient to provoke a syncope

We always complete our examination by looking for [illegible] (whic[illegible]ften present),

sis must be altered, and that gastrocolopexy with suspension is probably the best treatment —and the only one if there is gastrocolic dissociation.

RIASSUNTO

Attribuisce alla cura chirurgica una particolare importanza nella terapia della ptosi gastro-colica. Raccomanda vivamente la tecnica che l'A. ha proposto ed attuato. Questa non disturba la funzione dello stomaco e del colon: offre risultati eccellenti nel 75% dei casi. Ammette naturalmente che la chirurgia non può riparare in poche settimane il danno che deriva da tanti anni di inutile attesa. Dopo l'operazione, occorre vincere la stitichezza a la stasi intestinale. Per sviluppare i muscoli addominali occorre fare appello a speciali esercizi ginnatici e massaggi. Raccomanda anche esercizi respiratori che, allargando la base del torace, contribuiscono ad innalzare lo stomaco ed il colon. E' veramente sorprendente rilevare come la terapia fisica e le cure mediche, inutili prima dell'operazione, producano in pochi mesi un notevole aumento di peso, un migliore appetito, un'accresciuta energia, insomma una vera rifioritura dei pazienti.

SUMARIO

En el tratamiento de la ptosis gastro-colica, la cirujia es de importancia. Recomendamos en especial la tecnica operatoria que nosotros usamos, por cuanto esta no afecta la fisiologia normal del estomago o del colon y en nuestras manos nos ha dado un 75% de resultados excelentes.

Reconocemos que la cirujia no puede reparar en pocas semanas el dano producido en varios anos. En el tratamiento quirurjico por la medicacion hipertonica del estomago es esencial el persistir en el tratamiento de la constipacion y de la estacia intestinal. El masaje y el ejercicio especial de la pared abdominal es de importancia para fortalecer los musculos abdominales; lo mismo se puede decir de los ejercicios respiratorios que al ensanchar la base del torax favorecen el levantamiento del estomafo y del colon.

Es sorprendente el ver como este tratamiento post-operatorio produce en pocos mesos un gran cambio en el paciente que se manifiesta en aumento de peso, mejor apetito, aumento de fuerzas etc. Por esta razon, en nuestra opinion, la ptosis gastro-colica, debe de ser tratada por el tratamiento que recomendamos: La gastro-colo-pexia con suspencion, seguido por el tratamiento post-operatorio ya descrito.

SOMMAIRE

Dans notre opinion, le traitement chirurgical a une place importante dans la ptose gastrocôlique. Nous recommandons la technique que nous avons établie. Elle ne dérange pas la physiologie de l'estomac ou du côlon, et elle nous a donné de bons résultants dans 75% de nos cas.

Naturellement, la chirurgie ne peut pas en quelques semaines réparer le mal fait par plusieurs années. On complètera le traitement chirurgical par les médications hypertoniques de l'estomac. Il ne nous faut jamais cesser de combattre la constipation et la stase intestinale. Le massage abdominal et des exercices spéciaux sont nécessaires pour développer les muscles abdominaux. Il importe de faire grand usage d'exercices physiques respiratoires qui elargissent la base du thorax et qui contribuent à élever l'estomac et le côlon. Il est surprenant de voir que tous ces exercices physiques, qui étaient presque inutiles avant l'opération, produisent aprés l'opération une augmentation de force, un meilleur appétit et procurent une nouvelle vie pour le malade. Pour ces raisons, nous concluons que la théorie du traitement de ptose gastrocolique doit être changée et que la gastrocôlopexie avec suspension est probablement le meilleur traitement et le seul s'il y a dissociation gastro-colique.

Case Report

Simultaneous Occurrence of Gallstones and Widespread Calcification of Visceral Arteries*

Y SEUDERLING M D , F I C S
HELSINKI, FINLAND

CALCIFICATION of the splenic artery often combined with an aneurysm, is a well known entity, but widespread calcification of the visceral arteries and the simultaneous occurrence of gallstones is rather uncommon The case reported below may therefore be of interest

CASE REPORT

The patient was a woman, aged 70 The previous history of disease was without interest In 1946, arterial hypertension, with a systolic blood pressure of 250 mm Hg, and temporary loss of sight were observed In March 1948, vertigo, failure of mental concentration and loss of speech occurred the patient was treated with digitalis and novurit The body build was usual, the subcutaneous fat was reduced Neurologic examination gave negative results The lungs were normal, the heart was degenerated and the radial artery was sclerosed The blood pressure ranged from 180/80 to 250/90 mm Hg The urine contained small amounts of albumin and sugar

Arterial hypertension, arteriosclerosis, and diabetes mellitus were present Roentgen examination showed the lungs to be normal and the heart slightly degenerated The aorta was sclerosed The calcified splenic artery originated at the level of the first and second lumbar vertebrae to the left of the column, forming an upward loop to the level of the twelfth thoracic vertebra, where it turned downward to the level of origin and divided there into two branches The ramifications of the upper branch contained calcifications, the lower enlarging to an aneurysm In the spleen were numerous small calcifications The spleen was slightly enlarged The left renal artery was calcified and the right one contained calcified spots The abdominal artery showed advanced calcification in the frontal film The gallbladder contained numerous gallstones with calcified shells (Fig 1) In the spinal column there were advanced deforming changes

General arteriosclerosis seems to have been the main etiologic factor in this case Diabetes may have had a bearing upon the development of sclerosis, and the arterial hypertension appears to have been of long standing The changes in the spinal column were degenerative, and the occurrence of gallstones though it must be regarded as incidental, may have some connection with the sclerosing processes Symptoms referable to the nervous system indicated that sclerosed cerebral arteries as well as hypertension were present All of these symptoms formed an unusual complex Treatment was administered for diabetes and hypertension

Calcification of the splenic artery, sometimes combined with an aneurysm, has been mentioned by Key and Akerlund Lindboe,

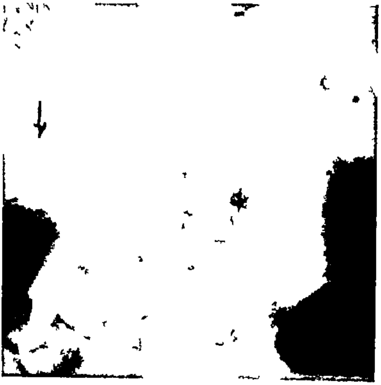

Fig 1 Calcified splenic artery The arrow indicates gallstones

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* From the Third Clinic of Internal Medicine University of Helsinki Finland

Haffner, and Säfwenberg, who reported similar cases, emphasized the importance of diagnosis *intra vitam* and pointed out that this is almost impossible without roentgenologically visible calcifications. Grashey also mentioned the possibility of roentgen diagnosis *intra vitam*. Fuchs, in two papers, discussed the calcification and aneurysm of the splenic artery and other visceral arteries. The observations of Israelski followed the same lines as regards the roentgen picture.

Belot, Chaumet, Didiée and Chainville also disclosed an enlarged spleen in connection with a tortuous splenic artery. Bachman observed calcifications in 11 cases and discussed in detail the differential diagnosis of calcifying processes in the splenic region. Blefari-Melazzi referred to a case of enlarged spleen, calcified splenic artery and simultaneous occurrence of fistulas (gallbladder-colon and gallbladder-duodenum).

Calcified hemangiomas were referred to by Ponzio; numerous mulberry-shaped shadows the size of a cherry were observed in the spleen. The possibility of tuberculosis, syphilis and calcified parasites was discussed. Similar observations were made by Polgar and Szemzo, who also mentioned tuberculosis as an etiologic factor. Hellgren stated that tuberculosis is the main etiologic factor. He noted calcified spots in the spleen of a girl aged 7. Some years previously she had suffered from pulmonary and hilar tuberculosis and tuberculous gonitis; these conditions had healed, with calcifications in the left lung as well as in the hilar lymph nodes. In Spitz's case the patient suffered from tuberculosis of the lungs and kidneys; the numerous calcified spots in the spleen were supposed to be of tuberculous origin. Buch mentioned tuberculous changes in the spleen with irregular calcium shadows.

Barsony and Schutz observed phleboliths, probably due to tuberculosis. This same feature was discussed also by Heilig, but in his case an earlier malarial infection may have played an etiologic role. Malaria is mentioned also by Viallet and Marchioni. According to High, a blood-borne infection in the spleen with resulting calcifications visible in the roentgen picture may be caused by histoplasmosis.

Calcification of the splenic vein was observed by Moberg, probably due to an earlier thrombosis. Bleich and Kipen recently reported an interesting case of the same kind in which this condition was combined with Banti's syndrome and bilateral ureteral calculi.

The literature reveals that calcifications in the upper left abdominal region are due to many etiologic factors. Lubarsch stated that the splenic calcifications are of varying origin and may be due to thrombosis, calcified parasites or chronic inflammations with ensuing change in the blood vessels and eventual calcification.

Calcification of the blood vessels may occur in the splenic artery and vein. In the former instance it is often combined with an aneurysm. Multiple small calcifications may be caused by phleboliths and calcified hemangiomas, occurring as the final outcome of tuberculosis and other infections, e.g., malaria and syphilis and, according to recently expressed views, histoplasmosis and calcified parasites. Also the origin may be unknown. An important factor is general arteriosclerosis. Large calcifications may be due to healed perisplenitis, infarction (Hardman), hematomas and echinococcal cysts. There may also be present a general increase in density of the spleen caused by iron or calcium incrustation.

Extrasplenic processes should be excluded in the differential diagnosis; e.g., calcifications of the adrenal gland (Samuel). The roentgen diagnosis of calcium-containing shadows in the splenic region may prove sometimes difficult. In many cases the history of disease may be helpful. Calcified splenic arteries and veins are easier to diagnose, since calcification of other abdominal vessels are frequently present too.

SUMMARY

A case of hypertension, diabetes and extensive calcification of visceral arteries, with simultaneous occurrence of gallstones is reported. The main observations were made by roentgen examination.

RIASSUNTO

Descrive un caso di calcolosi epatica complicata da ipertensione, diabete ed estesa calcificazione delle arterie viscerali. La diagnosi

è stata fatta principalmente mediante il sussidio dei raggi X.

SUMARIO

Se ha presentado un caso de calculos de la vesicula biliar con hipertension arterial, diabetes sacarina, y calcificacion extensa de las arterias viscerales.

Las observaciones principales en el diagnostico de este caso fueron obtenidas por el examen radiologico.

SOMMAIRE

Un cas d'hypertension, de diabète et de calcification étendue des artères viscérales avec apparition simultanée de calculs biliaires, est rapporté. Les principales observations furent faites à l'aide de rayons "X."

THE INTERNATIONAL COLLEGE OF SURGEONS

ANNOUNCES

HIPPOCRATES DAY

Sunday, October 23, 1949

Reception at the Home of the College—3:00 p.m.
Banquet—Crystal Ballroom, Blackstone Hotel—7:30 p.m.

HONOR GUEST

PROF. SKÉVOS ZERVOS, ATHENS, GREECE

College members and the Profession are cordially invited to attend the Reception and Banquet.

The Zervos collection of ancient surgical instruments and archeological findings of medical and surgical interest will be on display at the College Home during the week of October 23, between the hours of 10:00 and 5:00 p.m.

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News Notes

Classification of Disease in Sixth Revision of the International List

The first of the two volumes of the new Manual of the International Statistical Classification of Diseases, Injuries and Causes of Death was published recently. The first International List of Causes of Death was compiled toward the end of the last century and was revised every ten years. The present manual represents not merely the sixth revision of the old International List, but it also provides a single list which is applicable to morbidity as well as to mortality statistics.

This new classification, together with international regulations about its use, was adopted at the First Assembly of the World Health Organization in August 1948. It is hoped that "it will be not merely an object of interest to medical statisticians, but the instrument for collecting information into a common pool of knowledge from which in time all mankind will benefit."

Pan-American Congress of Criminology, Criminalistics, Legal Medicine and Odontology Held in Mexico City

The first Pan-American Congress of Criminology, Criminalistics, Legal Medicine and Odontology was held Oct. 23 to 30, 1949, in Mexico City. The program was varied catering to those persons concerned in this form of social and medical procedures. This group is made up of various Latin-American Societies having a common interest, having originated from the First and Second Latin-American Congress of Criminology, First Pan-American Congress of Criminalistics, First Pan-American Congress of Legal Medicine, and Odontology, and the First Pan-American Congress of Criminology. These several societies united to form one primary common organization for the October Congress.

Academy of Neurology Established

The establishment of the new American Academy of Neurology is the latest of the specialty group organizations to come into existence. The purpose of the Academy is "to further and encourage the practice of clinical neurology and to stimulate teaching and research in neurology and allied sciences." The Academy has three grades of membership: active membership open to all physicians who have been certified in neurology or neurology and psychiatry; junior membership open to those at present engaged in postgraduate study in neurology or awaiting certification; and associate membership for noncertified physicians whose interests are in allied fields.

The first scientific meeting of the Academy was held at French Lick Springs, New England, June 1, 2, and 3, 1949.

Tenth Annual Meeting of the Ambulatory Fracture Association

The Tenth Annual Meeting of the Ambulatory Fracture Association was held at Toronto, Ontario, Canada, Oct. 24 to 27, 1949. The preliminary program offered a wide variety of topics and was interesting to men who concern themselves with skeletal fixation, intramedullary fixation, reconstructive surgery and fractures and traumatic injuries. Because of the many presentations by men from foreign countries, the meeting unfolded new approaches to the attack on fractures.

Pan American Medical Women's Alliance Schedules Second Congress

The Pan American Medical Women's Alliance, Inc., founded to further the interests of women physicians of the Americas, will hold their second congress in Los Angeles, Nov. 1 to 6, 1949. Representatives are expected from all the Latin American Republics as well as from the United States, Canada, Hawaii, and Alaska.

French Congress of Medicine Meets in Geneva

The French Congress of Medicine was held in Geneva, Oct. 6, 7, 8, 1949, under the presidency of Dr. M. Roch.

Among the subjects discussed were, Experimental Results from the Treatment of Cancer with Hormones, Hormonal Treatment of Tumors of the Testes, and Hormonal Treatment of Prostatic Cancer.

CHAPTER NEWS

Mexican Chapter

The First Mexican Congress of Gynecology and Obstetrics was held in Mexico City, May 22 to May 28. Prof. Dr. José Rábago, F.I.C.S., regent of the Mexican Chapter, is the vice-president of this organization. Other members of the College who participated in this meeting were: Dr. Antonio Sordo Noriega, Dr. Díaz Infante, and Dr. Ramón Osorio y Carvajal, Dr. Gandolfo Herrera of the Argentine Chapter, Dr. Rodrigo Franco and Dr. Lucas Molina of the Peruvian Chapter, and Dr. P. A. Gutierrez Alfaro and Dr. Julio Calcano of the Venezuelan Chapter.

Professor Dr. Gustavo Argil, F.I.C.S., formerly director of the Faculty of Medicine of the National University of Mexico, has been appointed assistant secretary of health of Mexico.

Prof. Dr. Serapio Muraira, F.I.C.S., was recently appointed director of the Faculty of Medicine of the University of Nueva León, Monterrey, Mexico.

Prof. Dr. Esteban Paulín, F.I.C.S., Mexican Chapter, and member of the International Board of Trustees, has been appointed director of the Civil Hospital at Queretaro, Mexico.

Dr. Francisco Cid Fierro, secretary of the Mexican Chapter, has been appointed surgeon-in-chief of the National Railways of Mexico.

Colombian Chapter

Prof. Dr. Manuel A. Manzanilla, vice-president of the International College of Surgeons, has been honored by the National Academy of Medicine of Colombia and has been elected a foreign correspondent of the Academy.

Prof. Dr. Jorge E. Cavelier, a member of the International Board of Trustees of the International College of Surgeons and President of the Colombian Chapter of the International College of Surgeons has recently been appointed Minister of Health of the Republic of Colombia.

Italian Chapter

The Italian Chapter held its first Annual Assembly in Naples on May 26 and 27, 1949. More than eighty members and surgeons from Italy and other countries were present. An excellent program was arranged and the following officers were elected for the coming year.

Prof. Dr. Luigi Torraca, director of Surgical Clinics, University of Naples, president; Prof. Dr. Galeno Ceccarelli, director of the Surgical Clinic, University of Padua, and Prof. Dr. Luigi Di Natale, surgeon-in-chief, hospital Fatebenefratelli, Milan, vice-presidents; Prof. Dr. Antonio Bobbio, Turin, secretary; and Dr. Luigi Solerio, Turin, treasurer.

The newly elected board of regents consist of the following men:

Prof. Dr. Alfonso Chiariello, director of the Hospital dei Pelligrini, Naples; Prof. Dr. S. Latteri, director of the Surgical Clinic, University of Palermo; Prof. Dr. Gian Carlo Peracchia, surgeon-in-chief, Trieste hospital; and Prof. Dr. Antonio Romani, surgeon-in-chief, Venezia hospital, Venice.

Nicaraguan Chapter

The Nicaraguan Chapter of the International College of Surgeons was inaugurated on March 28, 1949, under the direction of Dr. Desiderio Roman, member of the International Board of Trustees. The following officers were elected: Dr. Tomas Pereira, president; Dr. Luis M. Debayle, vice-president; and Dr. Fernando Velez Paiz, executive secretary.

Brazilian Chapter

The Brazilian Chapter of the International College of Surgeons was reorganized May 30, 1949. The following officers pro tem were elected: Prof. Dr. Carlos Gama, president; Dr. J. Avelino Chaves, vice-president; and Dr. Sebastiao Hermeto, Junior, secretary.

Dr. Fernando Luz, Filho, A.I.C.S., Bahia, Brazil, was elected president of the general surgery section of the Bahia Association of Medicine for the coming year.

Finnish Chapter

At the Annual Meeting of the Finnish Chapter in Helsinki, Jan. 29, 1949, the following officers were elected: Prof. Dr. Tauno Kalima president; Prof. Dr. Vaino Seiro, vice-president; Dr. Atso Soivio, secretary; and Dr. A. Pelkonen, treasurer.

Dr. J. E. M. Thomson, of Lincoln, Neb., vice-president of the United States Chapter, visited Finland this year where he was entertained by the Finnish Chapter. Dr. Thomson was impressed with the enthusiasm of the group and by their interest in the College and, particularly, in the United States Chapter.

Haiti Chapter

At a recent meeting of the Haiti Chapter of the International College of Surgeons, the following officers were elected: Dr. Martial Bourand, president; Dr. Elie Villard, vice-president; Dr. Ciceron Valme, secretary-treasurer.

Philippine Chapter

The Philippine Chapter was recently organized with the following officers elected: Dr. Baldomero Roxas, president; Dr. Basilio Valdes, vice-president; Dr. Manuel N. Tuason, secretary-treasurer.

New Books

Operating Room Technic By Edythe Louise Alexander (Ed 2) St Louis 1949 C V Mosby Co

A new and revised edition of this excellent text book should be warmly welcomed. Written by a registered nurse of wide and varied surgical experience, it will be especially useful to nurses who take their profession seriously as the author does and who are interested in bringing their operating room technic as near to perfection as possible.

The book is lavishly illustrated with photographs and line drawings, 668 in all. The arrangement care and cleaning of operating rooms the organization of work for the nursing personnel, and the care and sterilization of equipment are discussed with meticulous detail. Suture materials, together with the surgical terms appertaining thereto, are set forth with equal care and completeness. An unusually comprehensive outline for standardized operating room procedure covering all necessary duties with a minimum loss of time and energy is provided. The various surgical positions are described and illustrated. The chapter on surgical instruments contains orderly lists of those needed for special types of operation.

These topics all dealing so to speak with the background of surgical activity, occupy fourteen chapters, which in itself is sufficient evidence of the care and thoroughness with which they have been prepared. From Chapter XV, the book is devoted to special technics for special operative procedures, covering the entire surgical field of therapy in every part of the human body. There is a long chapter on reconstructive surgery of the bones joints and tendons followed by chapters on neurosurgery and vascular operations.

Efficient teamwork is emphasized throughout. Still greater emphasis if possible, is placed on nursing knowledge, exactness and efficiency. Not all of this emphasis, by any means is expressed in so many words. It is implicit throughout the book. Example is better than precept, and even the intelligent layman would find it impossible to glance through this book without being impressed by the author's earnestness and competence. Such professional devotion in a surgical nurse coupled as it is with such thorough knowledge of the work and such clear intelligent expression through the written word is a heartening thing to encounter. Also one should be aware of the increasing number of first rate professional texts written by professional women of which Miss Alexander's Operating Room Technic' is a sterling example.

Aesculapius Comes to the Colonies By Maurice Bear Gordon 1949 Ventnor Publishers

Occasionally down the current of the constant stream of textbooks and specialized professional publications comes a book whose value to its prospective owner is literary as well as professional. Aesculapius Comes to the Colonies is such a book. In giving as it does, a graphic picture of medicine in the early days of the American colonies it provides a sort of lens through which to view the whole of American colonial life, for life in colonial days was simpler than it is today, and the doctor was so intimate a part of it that it is impossible to depict him adequately without also shedding many highlights on the community he served.

In this book the regional differences among the colonies are shown in two ways, first, by an introductory note dealing with the particular colony under discussion, and again by highly characteristic excerpts from the physicians' diaries and documents. These latter provide intriguing reading both for their pungency and for the quaintly old fashioned language in which they are cast. All doctors who attained distinction in the Colonial period are presented. Six of them, including the famous Benjamin Rush, signed the Declaration of Independence—a large proportion of the total number of signers, showing unmistakably the strong and effective influence of the medical profession on Colonial public life.

The book is excellently illustrated with portraits of prominent physicians and reproductions of old illustrations from medical publications. It is to be recommended especially to the doctor who writes, for it is a gold mine of useful, interesting and sometimes amusing data.

Hematology By C C Sturgis, M D Pp 915 Springfield, 1948 Charles C Thomas $12 50

The publication of this scholarly volume on the blood marks the advent of one of the more important contributions of 1948 to scientific literature. The features which characterize this book are a meticulously exhaustive survey of the anemias, a learned discussion of the hemorrhagic states, and a thorough description of the leukemias, lipoid dystrophies and polycythemia. The final chapters are devoted to blood transfusions, and the subject of sternal puncture. Worthy of mention is a bibliography exceeding 1800 items.

Despite the general excellence of the book, it too suffers from its share of imperfections. For example, the proofreading has been sadly negligent; a glance at the heading of the final section on Page 501 reveals some glaring errors. One also finds such omissions as in the use of urethane in chronic myelogenous leukemia, stilbamidine in multiple myeloma, and the possible beneficial effects of colchicine in the treatment of leukemias in general.

The work is a commendable contribution to the medical literature of today.

Psychodynamics and the Allergic Patient. By Harold A. Abramson, M.D., with a panel discussion. Pp. 81. St. Paul, 1948, Bruce Publishing Co., $2.50.

In June of 1947, the American College of Allergists held a conference attended by a number of the country's outstanding authorities on allergy and psychiatry, in which an earnest attempt was made to coordinate the psychic and immunologic factors which prevail in the allergic patient. The first print to be borne from that progressive meeting has been the publication of the present work.

Essentially it consists of two papers: one on the historical aspects of the psychic factor in allergy, and the second on an evaluation of this factor, based on current concepts in physiology, biochemistry and pathology, as well as neuropsychiatry. The final portion of the work reproduces the interesting panel discussion which followed the presentation of the papers.

This preliminary effort sends out a strong plea for all physicians to bear in mind the importance of psychosomatic medicine, and future publications will be awaited with interest.

Campbell's Operative Orthopedics. Edited by J. S. Speed and Hugh Smith. (Ed. 2). Vols. 1 and 2. St. Louis, 1949, C. V. Mosby Co.

The second edition of this important work differs from the first in that it has been greatly expanded, less than half the original material being now included in its original form. Extensive changes have been made also in the illustrations; about a third of those presented in the former edition have been eliminated, but twice as many new ones have been substituted for them. This edition contains entirely new chapters on preoperative and postoperative care, injuries of the peripheral nerves, and amputation. New subsections have been added on the ruptured intervertebral disc, mold arthroplasty, and difficult or unusual cases of nonunion.

In order to avoid repetition, the editors have placed at the beginning of Volume 1, all material on preoperative and postoperative care, surgical apparatus, surgical approaches and the like, referring to these early chapters when necessary. Fractures, dislocations and traumatic diseases of the joints are then discussed, with special attention to malunion, delayed union and nonunion. The new chapter on injuries to the peripheral nerves has special contemporary interest, many such injuries having resulted from combat in World War 2.

Volume 2 opens with a discussion of miscellaneous joint diseases, followed by a chapter on articular tuberculosis. Arthrodesis and arthroplasty are each described in a full and separate chapter. These sections are followed by one on miscellaneous diseases and abnormalities of bone. Tumors of the bones, joints and soft tissues are treated in an exhaustive chapter illustrated chiefly by roentgenograms. Among other conditions covered in Volume 2 are various pathologic conditions of the muscles, tendons and tendon sheaths; diseases of the skin, fasciae, and bursae; anterior poliomyelitis (which is discussed at great length); miscellaneous diseases of the nervous system; static or postural diseases and abnormalities, and congenital anomalies.

There are 1141 illustrations in the two volumes, including two color plates. An elaborate cross-index adds to the user's convenience. Bibliographic references at the end of each chapter are plentiful. The work is thus a compendium, so to speak, of orthopedic practice and experience, brought up to date and enlarged. Its alteration from its former condensed form, which took a great deal of reader information for granted, cannot but increase its permanent value as a textbook in this highly important field of surgery.

Practical Aspects of Thyroid Disease. By George Crile, Jr. Philadelphia and London, 1949, W. B. Saunders Co.

Carrying on in the steps of his distinguished father, the junior Crile offers this clinical evaluation of methods of treating thyroid disease in the light of new knowledge of derivatives of thiourea roentgen radiation and radioactive iodine.

The author emphasizes the need of both surgeon and internist for a broadened perspective in relation to disease of the thyroid, with each recognizing all the aspects of the problem and appreciating the function of the other in its treatment.

An excellent section is devoted to the use of antithyroid drugs both in preparation for and instead of surgical intervention. Although the application of radioactive iodine is in an early stage, Dr. Crile evaluates it on the basis of present knowledge. He recommends limiting its use in the treatment of hyperthyroidism to elderly per[illegible] and those with special complications, since [illegible] means of treating the disease in young persons have proved satisfactory He states, however, that the substance may offer the preferred treatment in all cases of Graves' disease

The sections on thyroidectomy are comprehensive While most of the book is devoted to hyperthyroidism, less frequent diseases of the thyroid gland are treated adequately One hundred illustrations amplify the text

The author concludes that conventional methods of treatment must be relied on until new procedures pass the test of time, but he offers this volume to increase the physician's knowledge of the potentialities of internal medicine, roentgen therapy nuclear physics and surgery in the treatment of thyroid disease, so that the specialist in any of these fields can enlist the cooperation of other specialists when the needs of the individual patient require it

Ambulatory Proctology By Alfred J Cantor MD Pp 524 New York, 1948, Paul B Hoeber, Inc, $8 50

This work brings to mind that well known aviation maxim "Any landing you can walk away from is a good landing" Thus the author's convictions prove correct, it will enable the surgeon to perform much more ambulatory treatment of conditions formerly sent to the hospital, an important consideration in these days of scarcity in hospital beds

The opening chapters, devoted to such general considerations of anatomy, diagnosis, anesthesia, preparation and management of rectal cases, are followed by a discussion of a veritable host of rectal conditions The book is comprehensive, short of such major procedures as extirpation of the rectum or sigmoid, etc Common ailments, such as pruritis ani, hemorrhoids, fistula in ano, fissure, etc, are lucidly described, and the therapeutic procedures advocated are feasible and well within the range of those of limited experience

This book is recommended to any doctor who wishes to increase the potentialities of his office practice with particular reference to rectal conditions

Surgical Extrapleural Pneumothorax By Donato G Alarcon, MD Mexico City, 1948, Imprenta Universitaria

This is a plea for extrapleural pneumothorax as a method of collapsotherapy in order to replace the thoracoplasty It was first enthusiastically adopted in Mexico (when it came from Germany), and after 1932, many hundreds of patients were subjected to the operation Later on the enthusiasm turned into outright rejection The author describes his position as a one man's stand against a world of critics whose experiences are said to be limited, thus not permitting fair evaluation of the merits of the method

The author may be assured that he is not alone in his beliefs Brunner, (Zurich, Switzerland) and Gostha Lundh (Landskrona, Sweden) have in the last years published many favorable reports, which are based on a hundred or so observations followed over a long period of time This book would have gained much if it included these experiences

Handling of references is the weakest point of the text He places a great number of names—partly misspelled—into the book frequently not giving the source of his information in the lists of references

X ray pictures are reproduced poorly Extent of the tuberculous lesion is often indiscernible

As to the actual value of the method, Eloesser in the introduction highlights the problem in saying 'Extrapleural pneumothorax is a one man task one for a man who knows how to, who can and will carry on, once the pneumothorax is initiated It is to the continuous careful attention of a single phthisiologist that success is due"

Semeiotica E Diagnostica Chirurgica By A M Dogliotti and Contributors Vol 1 Pp 767 Torino, Edizioni Minerva Medica, 1948

This work is intended as a practical surgical manual for practitioners and undergraduates, and has been prepared by some of the outstanding surgical luminaries of Northern Italy under the senior editorship of Professor Dogliotti

Contents of this first volume deal with general considerations, radiology, infections, skin, muscles, bones and joints, the vascular and nervous systems, and they comprise the first half of the book The remainder of the work is devoted to special surgery of the skull, spinal column, and extremities

A second volume which is to be released in the near future will deal with surgery of the thorax and abdomen

The surgical matter has been presented in a learned manner, but this scholarly treatment does not prevent the work from admirably filling the didactic needs for which it was originally intended The illustrations are excellent and have been clearly reproduced Operative technic, as might be expected in an elementary textbook of surgery, has been wisely held in abeyance For the rest, suffice it to say that if this book is chosen to serve as a model teaching tome of surgery in the medical schools of postwar Italy, it augurs well for the lofty traditions of Italian surgery

Abstracts from Current Literature

Brain Tumors: Diagnosis and Treatment. Adson, Alfred W., *and* Svien. Hendrick, *Rocky Mountain, M. J.*, 1948, 45:962.

The necessity of the early recognition of brain tumors emphasizing the importance of headache, nausea and vomiting, dizziness, and vague personality changes, are stressed. They likewise, offer a new classification of the gliomas which greatly simplifies older classifications. The chief advantage of the new classification lies in their effort to determine the malignancy of the particular glioma under consideration.

The new classification consists of astrocytomas, grade 1 to 4; ependymoma, grade 1 to 4; oligodendroglioma, grade 1 to 4; and neuro-astrocytoma, grade 1 to 4. They list medulloblastoma separately.

The advantages of pneumoencephalography, electroencephalography, arteriography, and the new diagnostic fluorescein-iodine isotope test are emphasized.

The authors discuss the surgical consideration and the advantages of an encapsulated accessible tumor. They believe that radical section of diffuse infiltrating tumors is to be avoided since they prefer to secure a shorter period of relief and preservation of more normal function rather than secure an extended, indefinite period of relief and spastic hemiplegia. They, likewise, feel that decompression should never be substituted for removal of a tumor when radical operation is at all feasible.

AVERILL STOWELL

Vagotomy. Grimson, K. S., Rundles, R. W., Baylin, G. J., Taylor, H. M., and Linberg, E. J., *J.A.M.A.*, 1949, 139:508.

The authors report a series of 49 patients in whom vagotomy, alone or combined with some other procedure, was used in the treatment for duodenal ulcer. In an early series of 36 cases, transthoracic vagotomy for duodenal ulcer was performed where at least 25 patients had minor discomforts unlike those before vagotomy; but 23 patients were satisfied with their operation. Secondary gastro-enterostomy was required in 10 patients and in two patients there was recurrence of ulcer requiring resection. Results were much better when the vagotomy was combined with gastro-enterostomy concurrently, and of 28 patients so treated, 21 were completely satisfied and none were dissatisfied with the operation.

It is interesting to note that pain may recur in one patient following vagotomy and in another following vagotomy and gastroresection. Results seem to be less satisfactory if a gastro-enterostomy is performed at a considerable interval following vagotomy.

Vagotomy was used in the treatment of seven patients with gastric ulcer. Three of the patients had prompt healing of the gastric ulcers and in one there was a recurrence of the ulcer; in another recurrence of symptoms, and in one patient resection had to be performed because of failure of the ulcer in healing.

Vagotomy was used in 19 patients with stoma ulcers. There was no operative mortality in these cases. Of the 10 patients with stoma ulcer following gastro-enterostomy, five reported complete satisfaction. Four of the patients had bizarre symptoms or felt poorly and one patient had a severe and complicated gastro-intestinal disturbance and expired two years after the operation.

Nine patients had stoma ulcers after previous gastric resection. Five reported complete satisfaction including one patient who had had repeated hemorrhages over a period of 18 years. It is interesting to note that one patient in this group developed an intussusception following vagotomy and another patient developed an intussusception following a primary vagotomy.

The authors feel that surgery is of value and that they can report recurrences in only that group of patients who had vagotomy alone as a treatment for peptic ulcer. Intussusception occurred in two patients and unexplained severe abdominal pain in eight. The usual side effects reported with vagotomy alone, such as diarrhea, atonicity of the stomach, and bizarre complaints, are reported by the authors. These effects seem to disappear with the passage of time.

In half of the patients tested two to four years after operation, there were large amounts of free acid in gastric secretions obtained after the occurrence of hypoglycemia due to insulin. It is felt that explanation and better treatment of side effects will be necessary before vagotomy may be considered a standard treatment of peptic ulcer.

M. T. FRIEDELL

Sepsis in Relation to Tumors. Browning, P., *Brit. M. J.*, 1948, 2:983.

Sepsis creeping into a surgical wound where [illegible] technic is rigi[illegible] ds one to infe[illegible] such an infec[illegible] e by a route [illegible] than direct [illegible] out. Learn

(1924) described invasion of undamaged arm muscle by Clostridium welchii following partial gastrectomy Blood cultures often show the occurrence of bacteriaemia after such a simple procedure as the extraction of infected teeth Such circulating organisms are generally disposed of by the blood Where bacteriaemia persists sites of lowered tissue resistance will favor the lodgment of the bacteria to form foci of secondary metastatic infection Muir (1941) has shown that tumors have little resistance to bacterial invasion

To ascertain whether tumor tissues are apt to harbor pyogenic infection, the author working in the department of Pathology and Bacteriology University and Western Infirmary, Glasgow, conducted some experiments on rats The rats were given a subcutaneous injection of 0 05 of tumor tissue in saline This tissue was obtained from rat sarcoma originally induced by Styryl—430 (P Browning 1941) The strain of staphylococcus was that used by Browning and Calver (1947)

First the tumor tissue was injected In about seven to 12 days the growth was about 1 cm long After this interval 1 ml of 1 in 20 dilution of an 18 hour agar growth of the staphylococcus was injected intraperitoneally In control experiments penicillin in three or four doses, each of 1000 2000 units were injected subcutaneously in the first 24 hours Tumor bearing rats, inoculated with staphylococci showed the presence of staphylococci along with coliform organisms and diphtheroids in the tumor after the death of the animal in 19 out of 52 animals Moreover the tumors of all 21 rats not inoculated with staphylococci, yielded no staphylococci although coliform organisms and diphtheroids were often present

The clinical applications of these experiments are two in number first, that minor sepsis should be regarded seriously in cancer patients second that adrenaline enhances the virulence of pyogenic organisms when it is injected at the site of inoculation Hence when an operation is done with the employment of local analgesics and adrenaline, prior clearing up of septic foci is of prime importance

R N COOPER

Blood Changes in Peritonitis Theron, P H, and Wilson, W C, *Lancet,* 1949, 1 172 178

In an effort to determine the cause of death in peritonitis and the mechanism of circulatory collapse which precedes the final dissolution, the authors studied the levels of total plasma protein, plasma albumin, and hemoglobin Thirty five patients with severe peritonitis furnished the basis for this study The severity of the infection is suggested by the fact that 36 percent of the patients died As a result of these studies they noted a reduction of blood volume This reduced blood volume was chiefly the result of a reduction in plasma volume A reduction of blood volume of 20 to 30 percent was not unusual in this group of patients The reduction in plasma volume was accompanied by a parallel reduction in the total circulating plasma protein The reduction in plasma protein was due chiefly to a loss of plasma albumin

No close correlation between the volume changes and the concentration of blood constituents such as hemoglobin, plasma protein, and plasma chlorides was noted The chief cause for the reduction in blood volume was considered as being due to ileus and was the result of an exudation of plasma into the peritoneal cavity as well as the bowel itself It was quite evident that the reduction in blood volume resulted in renal injury Renal failure was found at times to be an important cause of death

M O CANTOR

Vaginal and Cervical Smears in Uterine Malignancy Schram, Maxwell and DiPalma, Salvatore, *Am J Surg*, 1949, 77 191

Vaginal and cervical smears for the diagnosis of malignancy is the only known method today by which an early diagnosis of cancer can be made This method should be adopted as a routine procedure, and all hospitals and clinics dealing with gynecologic conditions should train gynecologists in the technic and interpretations of smears Papanicolau's work in 1928 is cited in which he found that cancer cells may be present in vaginal smears The work of Papanicolau, Traut Meigs, Ayre, Jones, Newstadter and Mackenzie, is reviewed Specimens from urine, sputum gastric and prostatic material have been studied Cells are ordinarily classified as normal suspicious, malignant

The advantages of smear technic are (1) smears can be repeated frequently without subjecting the patient to repeated biopsy or curettage, (2) preinvasive carcinomas can be diagnosed in grossly innocent appearing cervices, (3) local recurrences can be detected before clinical findings would be positive, (4) as a screening process it is the quickest and least expensive for the patient Whereas the disadvantages include the staining technic which is long and which has not been completely perfected and also special training in cytology is necessary for interpretation of the smears

GILBERT I DOUGLAS

Abstracts from Current Literature

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M. T. Friedell

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Sepsis creeping into a surgical wound where the technic is rigidly aseptic, leads one to infer that such an infection can take place by a route other than direct contact from without. Learmonth

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Original Articles

Bilateral Vagal Resection, the New Approach to the Peptic Ulcer Problem

Analysis of 100 Cases

R L SANDERS, M D
MEMPHIS, TENN

IN VIEW of the vast amount of evidence of a psychic factor in the production and maintenance of peptic ulcer it would appear that we have in bilateral vagal resection a weapon which, if rightly employed attacks this disease at its source Although identical in principle to gastroenterostomy and gastrectomy, vagal resection differs from both Whereas gastroenterostomy merely circumvents gastric acidity and gastrectomy seeks to eliminate the acids by radical excision in the interception of the nervous stimuli which control the activity of the parietal cells of the stomach this procedure represents an indirect approach to the problem

The growing number of group case studies being reported is evidence of an increasing use of vagal resection and of serious efforts to estimate its early effects Questions of the clinical benefits of the operation their degree and duration within the period of observation, are clearly paramount The secondary effects are, to a large extent still obscure yet sufficient time has elapsed in many cases to indicate their nature In pursuance of efforts to evaluate this procedure from a clinical and physiologic standpoint, we are presenting a study of 100 vagal resections in our private practice

In all these cases, transabdominal resection was employed This approach seems to us preferable in that one may thus visualize the disease process and determine its location, nature and extent, and, if necessary, may perform definitive surgery through the same incision Not infrequently, other abdominal lesions which also require surgery are associated Further, the patient's convalescence is shorter and more comfortable and complications are fewer Advocates of the transthoracic route report that all the nerves are more easily resected from above the diaphragm This is not a serious consideration, however, as all the nerves are accessible and may be amply resected in more than 90 percent of the cases

In using the abdominal approach, we have found it advantageous to leave the stomach

In Memoriam

MILTON BODENHEIMER

M.D., F.A.C.S., F.I.C.S.

It is with deep regret that we record the death of Dr. Milton Bodenheimer, a founder fellow of the International College of Surgeons. Dr. Bodenheimer, who was attending and consulting surgeon on the staff of the Hospital for Joint Diseases, New York City, was 69 years old. He attended Columbia University, College of Physicians and Surgeons, and graduated in 1903. He then served his internship at Mt. Sinai hospital, New York City. Among the official positions which Dr. Bodenheimer held, the following can be mentioned. He was associate surgeon at the Hospital for Joint Diseases, 1920-1926; he was associate surgeon at Sydenham hospital, New York City, 1920-1927; he was then attending surgeon for these institutions from 1928 until the time of his death.

Dr. Bodenheimer, active in surgical and medical societies, belonged to the following organizations: New York Academy of Medicine; New York County Medical Society; Society for Plastic and Reconstructive Surgery; Harlem Medical Society Committee on Surgery; Workmen's Compensation Board, Medical Society of New York County; American Board of Surgery; and the Association of Military Surgeons of U. S. A.

HUGH FRANCIS LENA

M.D., F.A.C.S., F.I.C.S.

Dr. Hugh Francis Lena died Nov. 8, 1948, at the age of 60. Dr. Lena, of New London, Conn., had his academic training at Dartmouth College, and received his B.A. in 1912. In 1916 he graduated from Johns Hopkins Medical School. From 1918 to 1919 he served his country during the war as a Lieutenant in the U.S.N. Med. Corp. Later he founded his own hospital, which consisted of 26 beds. Dr. Lena was active in surgical societies, of which the following can be listed. He was a member of the Connecticut State Medical Society, vice president of New London County Medical Society, fellow of the American Medical Association, fellow of the American College of Surgeons, and fellow of the International College of Surgeons.

JERRY ERNEST FLEISCHNER

M.D., A.I.C.S.

Dr. Jerry Ernest Fleischner died of a coronary attack, Dec. 26, 1948, at the age of 50. Dr. Fleischner took his M.D. at the University of Illinois in 1922, and served his internship at the West Side hospital, Chicago, from 1922-1923. His hospital positions consisted of being instructor at the Gynecology Clinic and Dispensary, at the Illinois Postgraduate School, and he was senior surgeon at the Loretto hospital, Chicago. Dr. Fleischner was a member of the American Medical Association, the Chicago Gynecological Society, the Chicago Medical Society, and the Illinois State Medical Society.

HENRY ANTHONY VITI

M.D., A.I.C.S.

On Dec. 11, 1948, Dr. Henry Anthony Viti died at the age of 41. Dr. Viti received his medical training in Europe at the University of Rome, School of Medicine, graduating in 1936. He had his postgraduate work at New York Medical College, specializing in the anatomy of the abdomen. Dr. Viti was associate attending surgeon at St. Francis hospital, Jersey City, N. J., since 1945. He was a member of the Hudson County Medical Society, the New Jersey State Society and the American Medical Association.

HOMER W. SMITH

M.D., A.I.C.S.

On Sept. 5, 1948, Dr. Homer William Smith of Rochester, N. Y., passed away at the age of 63. Dr. Smith received his medical training at the University of Buffalo and took various postgraduate work at London, Edinburgh, Berlin, Rome, and at the Lahey Clinic in Boston. He was attending surgeon at the Park Avenue hospital, Rochester, and was a member of the New York State American Medical Association, Medical Society of the County of Monroe, Rochester Academy of Medicine, and Rochester Pathological Society.

motility has been good almost from the beginning and roentgenograms have shown evidence of healing of the ulcer within a few weeks after operation In addition a number of these patients were troubled with diarrhea early in their postoperative course, though this, also, subsided after a time

One of these patients had persistent ulcer symptoms following vagal resection alone and his acids remained high Eight months postoperatively, the abdomen was reopened and it was found that all the nerve fibers had not been sectioned The resection was completed and a gastroenterostomy made and he has since had no difficulty

It will be observed that only three other patients had a vagal resection alone for primary duodenal ulcer All had considerable trouble with fullness for several months but at present are experiencing little or no discomfort

Another patient of this group had a massively bleeding gastrojejunal ulcer with almost complete obstruction of the stoma The gastroenterostomy was disconnected and a gastrectomy was performed in addition to vagotomy This patient, as well as the five who had a vagal resection alone for stomal ulcer, has remained entirely well

We attribute much of the success of vagal resection in the remainder of these cases to the fact that a drainage operation was performed at the same time The two patients who had a pyloroplasty had no cicatricial obstruction nor edema of consequence about the pylorus, hence the outlet was simply enlarged Under such circumstances we believe pyloroplasty is preferable to gastroenterostomy

Fifteen of the 100 patients were regarded as having a good or fair result as shown in Table 2

TABLE 2

Operations in 15 Cases of Peptic Ulcer
(Good or Fair Results)

Vagal resection only	5
Vagal resection and gastroenterostomy	9
Vagal resection and gastrectomy (For both duodenal and gastric ulcer)	1

The postoperative complaints of patients in this group have consisted variously of mild nausea and fullness after meals, occasional eructations of bile and foul gas, weakness, a slight hunger sensation, and diarrhea Only one patient complained of a hunger sensation however, he had a vagal resection alone, and it is believed all the nerves were not sectioned Roentgenograms have shown poor gastric motility Also after vagotomy alone one other patient continues to have mild diarrhea in addition to moderately troublesome symptoms of decreased motility

All of the five patients who had a vagal resection without a drainage operation still have some gastric retention nausea and belching of foul gas Two probably will require a gastroenterostomy Of those who had a gastroenterostomy in conjunction with vagotomy, three have some degree of atony, though two of the three have been operated upon fairly recently and may improve in time The postoperative acids of all these patients regardless of the type of operation have been low or zero, both before and after insulin

The patient who had a vagal resection and gastrectomy for duodenal and gastric ulcer continues to have some fullness and nausea The roentgenogram, however, shows normal emptying of the stomach It is our belief that his symptoms will eventually subside and he will obtain an excellent result

It should be pointed out that all the patients in this group feel that despite these mild or more or less transient disturbances they have been materially improved by the operation

The results in six cases have been unsatisfactory (Table 3)

TABLE 3

Operations in 6 Cases of Peptic Ulcer
(Unsatisfactory Results)

Vagal resection only	3
Vagal resection and gastroenterostomy	2
Vagal resection and disconnection of gastroenterostomy	1

Five of these patients had only a mild ulcer, or one which presented evidence of healing at the time of operation The preoperative acids were only slightly or moderately elevated in three yet all had every symptomatic and roentgenographic indication of an active tube in situ as a guide. The esophagus is readily brought within reach if the left lobe of the liver is first mobilized by division of its triangular ligament. The peritoneum is incised over the lower end of the esophagus, the index finger is passed through the diaphragm, and the esophagus is completely freed from the margins of the hiatus opening and drawn down about three inches. The nerve trunks are thus placed under tension and may be isolated and sectioned with little or no difficulty. It is our custom to excise approximately 2½ inches of the nerves. Since the upper ends retract into the chest, regeneration seems unlikely. Before being dropped back into its normal position, the esophagus is explored all around with the finger to determine whether the trunks have been severed. The peritoneum in front of the esophagus is then closed with a few interrupted sutures of catgut.

In performing gastroenterostomy or gastrectomy in conjunction with vagal resection, the nerves should be sectioned first, while the hand is sterile; if the stomach is opened first, infection may be introduced into the mediastinum by the contaminated hand.

The 100 patients comprising this review were operated upon between Oct. 1, 1946, and April 1, 1948. These operations were performed for every type of ulcer except the acutely perforating and the massively bleeding during the actual hemorrhage. Two patients had perforating ulcers which were protected. In addition to the patients with duodenal ulcers, three had gastric and duodenal ulcers combined, and six had gastrojejunal lesions. Because of the possibility of malignancy, we have not employed gastroenterostomy with vagal resection for gastric ulcers. In seventy-seven of the cases of primary duodenal ulcer, a gastroenterostomy was performed, and in two a pyloroplasty. In three of the former, the gastroenterostomy was necessary as a secondary operation following vagal resection alone. Sixteen patients had a vagotomy without either gastroenterostomy or pyloroplasty; of these, the majority were performed in our early experience with the procedure.

In addition to the 100 patients of this study, we have performed vagal resection in 32 others, or a total of 132. Two of the additional 32 patients died too soon after operation to permit an estimate of the end results. One died of a cerebral thrombosis a few weeks after leaving the hospital, and the other succumbed to pneumonia five months postoperatively. Fourteen patients have been operated upon too recently for inclusion in this review. We have also performed either bilateral or unilateral vagal resection upon 16 patients who presented definite symptomatic and clinical evidence of peptic ulcer, yet, upon operation, were found to have only a duodenitis. This finding, incidentally, illustrates one advantage of the abdominal approach. Had the operations been performed through the thorax, the diagnosis of ulcer would have remained unquestioned.

We have classified the results in these 100 cases as (1) excellent, (2) good or fair, and (3) unsatisfactory or poor. The distinction has been difficult to make in some cases, though we have attempted to be conservative. The number in the first group, together with the operations, is shown in Table I.

TABLE I.

Operations in 79 Cases of Peptic Ulcer
(Excellent Results)

Vagal resection only	8
Vagal resection and gastroenterostomy	66
Vagal resection and pyloroplasty	2
Vagal resection and gastrectomy	3
1 for gastrojejunal ulcer	
2 for both duodenal and gastric ulcer	

The patients in this group have been entirely free of pain since the operation, can take a normal diet, on the whole without distress, have a good appetite, have gained weight, and can carry on their usual duties without ill effect. A few continue to have some slight postprandial discomfort, particularly after breakfast, or an occasional mild flurry of diarrhea, but, by comparison with their former condition, the result may well be considered excellent. It is noteworthy that among this group were several who, during the first postoperative months, were believed to have an unsatisfactory result because of discomfort incident to poor emptying of the stomach.

In the majority of cases, however, gastric

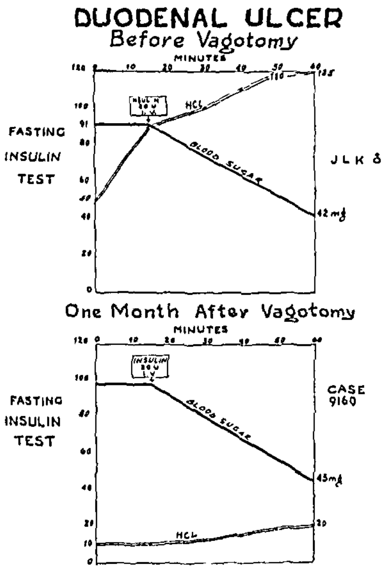

Fig. 2. This diagram shows typical results of insulin test before and after vagal resection The preoperative fasting acids were 50°, one hour following insulin, the acids were 135°. *It will be observed that the post operative acids rose from 10° during fasting, to only* 20° under the stimulus of insulin

tion, yet they are among those who have obtained the most outstanding successes All four had a gastroenterostomy On the other hand, four whose results were unsatisfactory *had only slightly elevated preoperative fasting* acids. None of these patients had a gastroenterostomy.

Nor have we found any distinct parallelism between the reactions to insulin and motility following operation Although a reduction of acidity was accompanied by decreased motility in a large proportion of the patients, a negative or low insulin curve was associated with normal motility in many, among them a few who had a vagotomy alone These findings, moreover, were not peculiar to any one end result group, but were shown in all three

We have also failed to demonstrate a consistent agreement between gastric motility and *the symptomatic relief of these patients.* The majority of those who obtained good or excellent results had a slightly or moderately decreased motility postoperatively. On the other hand a similar roentgenographic picture was obtained in a few who had unsatisfactory results In general, however, a material decrease in emptying time was accompanied by considerable fullness and distress

Further, symptomatic improvement has not always been commensurate with signs of healing of the ulcer In fact, in two patients whose results were unsatisfactory, the ulcers *apparently healed after operation.* Evidence of healing was observed in all those in the good and excellent result groups who had postoperative roentgenographic studies

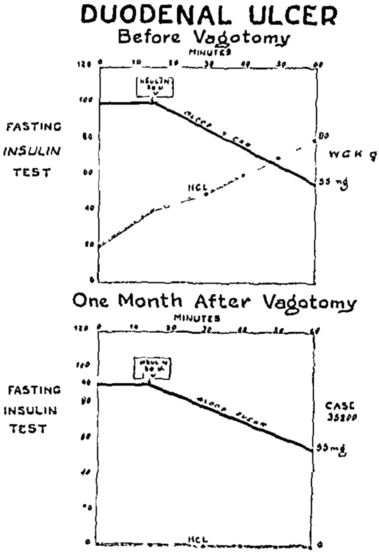

Fig 3 In this case, the preoperative acids during fasting were 20°, but reached 80° after insulin. Following operation, the acids were zero, both before and after insulin This patient also obtained an excellent result

ulcer. One patient who had a gastroenterostomy and vagal resection combined still complains of nausea, vomiting, sour stomach and nervousness. We are at a loss to explain this condition, as his acids were zero following operation, and the roentgenogram showed evidence of healing of the ulcer. Another patient had a gastroenterostomy subsequent to vagal resection; he still complains of discomfort, now three months postoperatively, although the ulcer apparently has healed. We believe this patient is quite definitely of the neurotic type. One of those who had a vagal resection alone had a gastroenterostomy elsewhere more than a year later, but died of a cerebral hemorrhage a few days following the operation. Another was operated upon 17 months ago. We believe that all the nerves were not sectioned, as his acids have remained the same as before operation and he continues to have considerable distress.

The sixth patient had a gastrojejunal ulcer which had perforated and was protected. The gastroenterostomy was disconnected, the ulcer excised and a vagal resection was done. He was free of symptoms for almost one year; thereafter, his symptoms returned and he became extremely nervous. His fasting acids at this time were 10 and his postinsulin acids were 70. The roentgenogram showed normal emptying of the stoma and a deformity of the duodenal cap.

In 24 of the 100 patients the appendix was removed, either prophylactically or for an associated mild appendicitis. Nine patients had other major abdominal operations at the same time.

Eight patients had pulmonary complications following operation: seven had atelectasis and one had pneumonitis. In one, atelectasis was of massive degree, though in none of the others were these complications serious. At the first sign of atelectasis, it is our custom to return the patient to the bronchoscopy room and have a specialist thoroughly aspirate the bronchi. This brings prompt relief and, in some cases, may be a life-saving measure.

We have had no operative deaths in this series of cases, though one patient, previously mentioned, died after a subsequent operation elsewhere.

Insulin tests were obtained on only 42 of the 100 patients. Two who had an unsatisfactory result continued to have high acids following vagal resection alone. In 36, the fasting free acids were zero or within normal limits after operation, either by vagal resection alone or with a drainage procedure. One patient had only slightly elevated free acids preoperatively; following vagal resection and gastroenterostomy combined, they remained essentially unchanged. Another had lower fasting acids after operation, though his postinsulin acids were higher following operation than before. Both these patients have obtained excellent results.

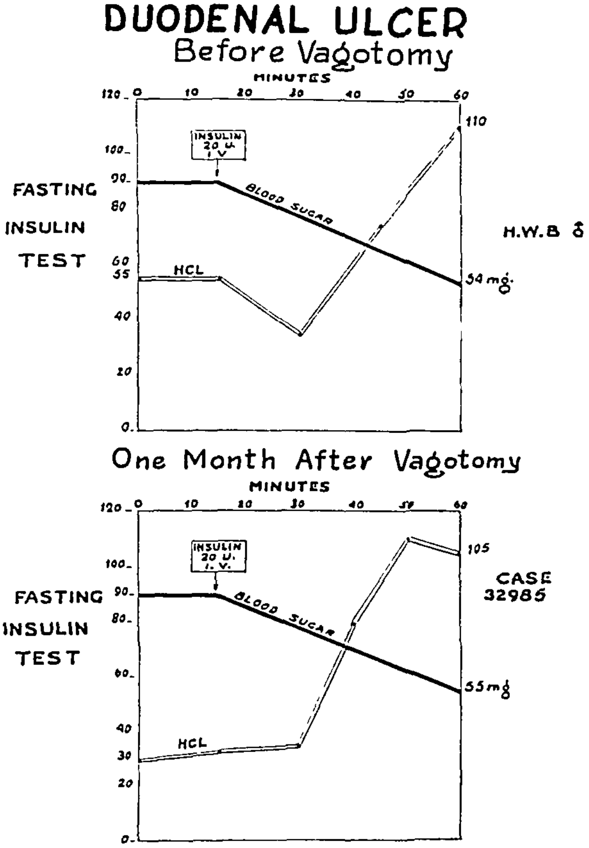

Fig. 1. Diagram showing an atypical curve in gastric acids under insulin hypoglycemia. Before vagal resection, the fasting acids were 55°, while one hour after the administration of insulin, the acids were 110°. The postoperative fasting acids were reduced to 30°, though the postinsulin curve reached 105°. This patient was one of those who obtained an excellent result.

No constant relationship has been observed between the preoperative acids and the surgical results. Four patients had free fasting acids well within normal limits before opera-

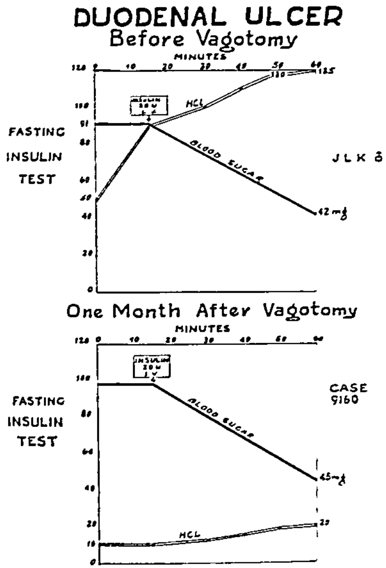

Fig 2 This diagram shows typical results of insulin test before and after vagal resection The preoperative fasting acids were 50°; one hour following insulin the acids were 135°. It will be observed that the postoperative acids rose from 10° during fasting to only 20° under the stimulus of insulin

tion, yet they are among those who have obtained the most outstanding successes. All four had a gastroenterostomy On the other hand, four whose results were unsatisfactory had only slightly elevated preoperative fasting acids. None of these patients had a gastroenterostomy.

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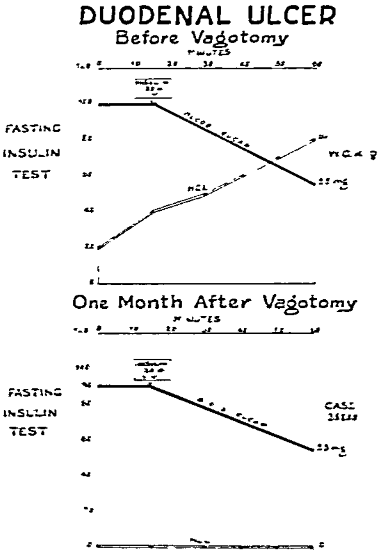

Fig 3 In this case, the preoperative acids during fasting were 20°, but reached 50° after insulin. Following operation the acids were zero, both before and after insulin. This patient has obtained an excellent result.

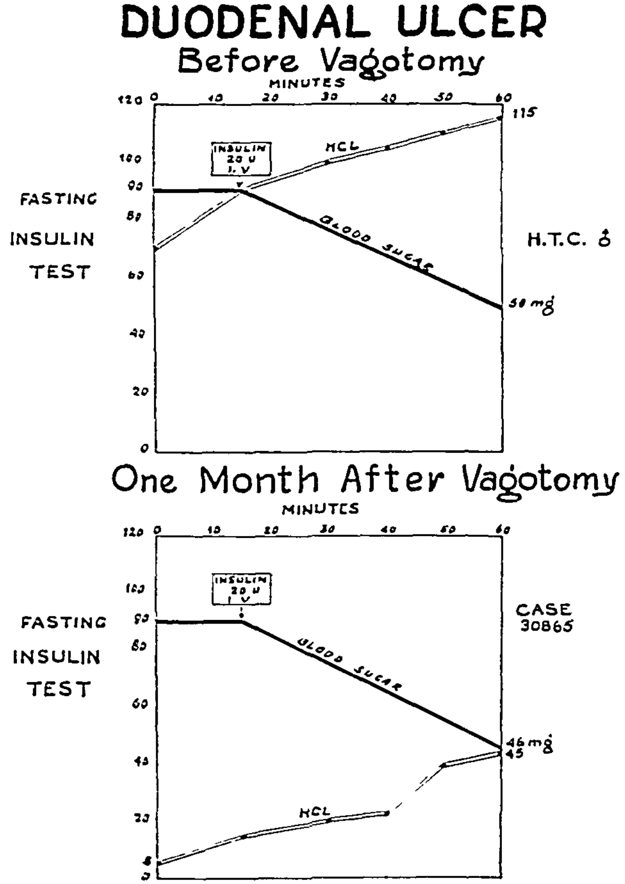

Fig. 4. Diagram showing acid curve of another patient who had an excellent result from vagal resection. The preoperative acids rose from a fasting of 70°, to 115° postinsulin. The fasting acids following operation were 5°, but reached 45° under insulin hypoglycemia.

One favorable effect, and one which has been a source of much gratification to these patients, has been the relief of constipation. Not infrequently, diarrhea proves troublesome during the early postoperative period, though this usually subsides and bowel function becomes normal within a short while. In only one of our patients, already mentioned, has an exception to this rule been encountered.

The most dramatic feature of vagal resection is the immediate cessation of pain. This alone generally justifies the operation in the opinion of the patients. Practically without exception, all those who complained of pain before operation have stated that they were free of pain upon awakening from the anesthetic. There is no doubt, moreover, that the relief of actual suffering has a salutary effect upon recovery.

In order to overcome gastric atony, it is our custom to leave the stomach tube in situ for three or four days after operation. In our early experience, a normal diet was permitted almost immediately following the operation. We found, however, that this practice was erroneous. After removal of the tube, we now place patients on a liquid diet for several days, and then on a soft and semisoft diet for a few weeks. Under this regime, gastric motility, if not adequate in the early postoperative period, usually becomes so within a reasonable time.

From observations thus far in these 100 cases, we feel justified in drawing several conclusions regarding vagal resection. In the first place, the procedure is most successful when performed for a definite, active ulcer. Otherwise, it cannot be relied upon to bring complete

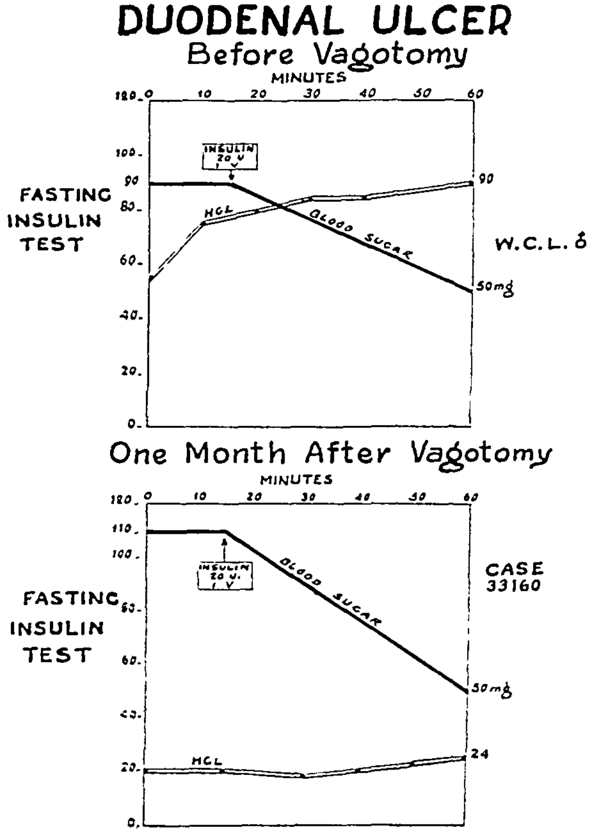

Fig. 5. In this case, the preoperative acids rose from 55° to 90°. Following vagal resection, the acids during fasting were 20°, and after insulin, 24°.

or lasting relief, even though the symptoms have been indisputably those of ulcer and the roentgenographic picture has substantiated this diagnosis. High preoperative acids add to the indication, yet are not essential. The surgical criteria having been fulfilled, the symptomatic response is, as a rule, excellent. In the typical case, relief of pain is accompanied by a slight or moderate gastric atony, low or negative acids, which remain essentially unaltered by insulin, and, within a few weeks or months, by healing of the ulcer. Any gastrointestinal disturbances, such as fullness and distress incident to retention, or diarrhea, tend to subside gradually. An unfavorable symptomatic and clinical response despite proper surgical indications is probably due either to a neurosis of the patient or to failure of the surgeon to resect all the nerve trunks.

The prospect for cure is materially better if the vagotomy is combined with a gastroenterostomy or pyloroplasty. We now add one of these procedures in every case except those wherein exploration reveals only a mild type of lesion without obstruction.

The safety and simplicity of vagal resection, particularly when performed through the abdomen, and its advantages over gastrectomy are sufficient to commend it for an exhaustive trial. Our experience thus far has [illegible] us to believe that, for patients with duodenal ulcer, it holds a bright promise; in fact, the high praise of these patients themselves is the most convincing argument in behalf of the procedure.

SUMMARY

1. If our conception of a psychic factor in the causation and maintenance of duodenal ulcer is correct, treatment of this disease by interruption of the nervous stimuli which control acid secretion and motility of the stomach would seem to have a sound physiologic basis.

2. In an effort to further an evaluation of bilateral vagal resection, 100 private cases are reviewed. These include gastrojejunal ulcers, as well as intractable, obstructive and bleeding duodenal ulcers. In the majority, a gastroenterostomy was combined with vagal resection, and in two a pyloroplasty was performed.

3. The abdominal approach was consistently employed. This method permits ample resection of the nerves, provided the left lobe of the liver is first mobilized. In our opinion, the abdominal route is preferable to the transthoracic, in that the disease process may be visualized and, if indicated, definitive surgery may be performed through the same incision. Further, convalescence is smoother and more comfortable, and complications are less likely to develop.

4. Of the 100 patients comprising this review, 79 have obtained an excellent result, with complete or almost complete relief of symptoms. Fifteen have good or fair results, continuing to experience some disturbance chiefly attributable to gastric atony. Six have thus far been only slightly benefited. The outcome in five of the latter is largely explained by the fact that the ulcers were mild in type, though in one of these cases vagal resection was probably inadequate and another had an ulcer neurosis.

5. Analysis of these groups indicates that bilateral vagal resection [illegible] most suitable for clear-cut, active ulcers, preferably, though not necessarily associated with high free acids. In such cases, pain should be relieved immediately and digestive disturbances should promptly or gradually subside as gastric tonus is restored. In the typical case, the post-operative acids are low even after the injection of insulin, and there is evidence of healing of the ulcer within a few weeks or months. We believe the prospect for cure is far more favorable if a pyloroplasty or gastroenterostomy is performed in conjunction with vagal resection.

RIASSUNTO

1. Se il concetto di un fattore psichico nell'etiologia [illegible] è corretto, l'interruzione [illegible] controllano la [illegible] la motilità dello stomaco [illegible] fisiopatologica [illegible] per la cura di questa malattia.

2. Cento casi [illegible] ulceri duodenali [illegible] [illegible]

vagale e' stata associata alla gastro-enterostomia: in due casi e' stata eseguita una plastica del piloro.

3. L'A. ha sempre preferito ricorrere alla via addominale, la quale consente un'ampia resezione dei nervi dopo mobilizzazione preliminare del lobo sinistro del fegato. La via addominale e' preferibile alla via transtoracica anzitutto perchè la prima consente una perfetta visione e valutazione clinica dell'ulcera e con ciò la possibilità di eseguire operazioni complementari con una sola incisione: in secondo luogo perchè la convalescenza e' più rapida, meno esposta a complicazioni.

4. In 79 casi i risultati sono stati eccellenti, con una completa o quasi completa cessaziones dei sintomi. In 15 casi i risultati sono stati buoni o discreti, con qualche lieve disturbo residuole, dovuto per lo più ad atonia gastrica. In 6 casi i risultati sono stati nulli o quasi.

5. L'analisis di questa statistica dimostra che la vagotomia è particolarmente indicata per le ulceri attive, a stampo, preferibilmente ma non necessariamente associate ad un'alta percentuale di acido cloridrico libero. In questa categoria di ulceri i dolori dovrebbero cessare rapidamente o gradatamente man mano che il tono dello stomaco si ristabilisce. Nei casi tipici i valori dell'acido cloridrico si mantengono—anche con la prova dell'insulina-bassi, mentre la guarigione dell'ulcera si manifesta clinicamente a distanza di alcune settimane al massimo a distanza di pochi mesi.

L'A. conclude dichiarandosi convinto che la probabilità un completo e definitivo successo viene notevolmente accresciuta dall'associazione con una piloroplastica o con una gastro-entero-stomia.

SUMARIO

1. Si nuestros conceptos modernos de factores psiquicos en la genesis de la ulcera duodenal es correcto, su tratamiento por la vagotomia es fisiologicamente logico.

2. Se han analizado los resultados de la vagotomia bilateral en 100 casos de pacientes de paga. Se han incluido ulceras gastroyeyunales, asi como ulceras duodenales intractables, con obstruccion y complicadas por la hemorragia. En la mayoria de los casos se practico la gastroenterotomia con la vagotomia bilateral; dos casos fueron tratados por la piloroplastia.

3. Consistentemente usamos la via abdominal, por cuanto permite mejor reseccion de los nervios, siempre y cuando se mobilice previamente el lobo izquierdo del higado. En nuestra opinion la via abdominal es preferible a la via transtoracica, por cuanto permite mejor visualizacion del proceso patologico y si esto lo indica, se puede practicar otros procedimientos quirurpicos por la misma incision. Aun mas, la convalesencia ofrece menos contratiempos para el paciente, por cuanto hay menos posibilidades de complicaciones postoperatorias.

4. 79% de los pacientes en esta serie han tenido resultados excelentes, con completo, o casi completo alivido de todo sintoma de la enfermedad. Un 15% han presentado buenos resultados, y aparentemente solo sufren de sintomas residuales debidos especialmente a la atonia gastrica resultan te Solo seis de los pacientes han recibido muy poco beneficio. De estos seis, cinco sufrieron de una ulcera muy benigna y en uno de ellos la reseccion del nervio fue probablemente inadecuada; y en otro la falta de alivio se debe en gran parte a que el paciente sufria de una neurosis intensa.

5. Analisis de estos grupos indica que la reseccion bilateral del nervio vago es el metodo de seleccion en los casos de ulceras activas, preferentemente, de ulceras con acides alta. En estos casos, el dolor se alivia inmediatamente y los desarreglos digestivos desaparecen con la reaparicion del tono gastrico normal. En los casos tipicos la acides es generalmente baja, aun despues de la insulina, y hay evidencia de cicatrizacion le la ulcera dentro de unas poces semanas o meses. Creemos que las posibilidades de la curacion incrementan si se combina la piloroplastia, o la gastro-enterostomia con la vagotomia.

SOMMAIRE

1)—Si notre conception d'un facteur psychique dans l'étiologie et le maintien de l'ulcère duodènal est correcte, le traitement de cette maladie par l'interruption des excitants

nerveux qui contrôlent la sécrétion acide et la motilité de l'estomac, paraîtrait avoir une base physiologique solide

2)—Dans nos efforts pour déterminer la valeur de la résection bilatérale du vague, nous passons en revue 100 cas de clientele personnelle Il est inclus des ulcères gastro jejunaux et des ulcères duodenaux occlusifs persistants et hémorragiques Dans la majorité des cas, nous fîmes une gastro enterostomie combineé a une résection du vague et dans deux cas nous fîmes une pyloroplastie

3)—La voie abdominale fût employee dans tous les cas Cette voie permet une résection suffisante des nerfs, pourvu que le lobe gauche du foie soit immobilise Nous sommes d'avis que la voie abdominale est preférable a la voie *transthoracique car ainsi les lesions sont mieux* exposees et opération définitive si eue est, indiquée, peut être faite par la même incision En plus, la convalescence moins agitee est plus confortable et les complications surviennent moins souvent

4)—Sur 100 malades inclus dans cette serie, 79 obtinrent un excellent resultat avec une remission completeous presque complete des symptômes, 15 eurent de bons résultats quoiqu'il persistat quelques troubles dûs principalement a l'atonie gastrique, 6 de ces derniers cas ne beneficierent que légerement de la therubuchique Dans five de ces cas, l'ulcere etait peu etendu, dans un cas, la résection du vague fut probablement non indiquee et dans un autre cas, nous avions a faire a une névrose compliquant l'ulcere

5)—L'analyse de ces groupes indique que la resection bilaterale du vague donne de bons resultats surtout dans les cas d'ulceres actifs, presentant ou non une haute hyperacidité Dans ces cas, les malades devraient être soulagees immediatement et les troubles digestifs devraient disparaitre a mesure que le tonus gastrique *se retablit Dans le cas typique*, l'acidite post operatoire est basse meme apres l'injection d'insuline, on constate la guérison de l'ulcere dans quelques semaines ou mois quelques Nous sommes d'avis que la guerison de l'ulcere est beaucoup plus frequente quand une pyloroplastie ou gastroenterostomie est faite correlativement a la résection du vague

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Concept of Gastroduodenal Ulcerogenic Disease

FEDERICO E. CHRISTMANN, M.D.
BUENOS AIRES, ARGENTINA

SINCE 1830, when Cruvelhier brought the attention of the medical world to the existence of gastric ulcer, this name has been adopted unanimously to designate a pathologic entity which, following a complicated mechanism (well known in our day), is the cause of ulcerations of the gastric and duodenal mucosae.

The appearance of the anatomic injury attracted the attention of all surgeons and clinical investigators, and its aspect, characteristics, and complications were described in full.

It is undeniable that the ulcer or anatomic injury is more peculiarly characteristic, gave its name to the affection, and therefore the notion of "ulcerous illness" was conceived.

Clinical and roentgen examination of the patient, together with functional study of the gastric secretion, makes possible an easy and accurate diagnosis in the majority of cases. The clinician applies medical treatment; if the patient does not notice any important improvement in his ailment (which requires the adoption of a permanent dietetic and hygienic regimen) a surgeon is called in to solve his difficulties. The patient is then submitted to an operation. In most cases the ulcer is detected and surgical intervention takes place in accordance with the technic indicated in the particular case.

In many instances however, the diagnosis of duodenal ulcer is made by the best clinicians and roentgenologists, and yet the anatomic injury does not appear. In such cases, analysis of the gastric juice gives sufficient coincident information to confirm the existence of the ulcer. The fact that the ulcer does not appear at operation is attributed to incorrect diagnosis, but, in spite of its nonappearance some surgeons perform gastrectomy. Others, more prudent, prefer to close the abdomen and prescribe continued medical treatment. Naturally the patient continues to suffer, and after a more or less prolonged interval, is submitted to another operation. Only then is an ulcer (which in the first operation was not visible) observed, now fully apparent. In my opinion, this situation is explained as follows: Owing to various factors, especially factors of psychic origin, the patient suffers at first from exaggerated vagal stimulation, consequently, hypersecretion and hyperquilia (hyperacidity) appear, mainly in the guise of nocturnal permanent secretion in any empty stomach.

Chlorhydric acid when present in abnormal amounts, has an irritating action on the gastric mucosa, intensified by prolonged contact with the same, without being diluted in the food taken as nourishment and especially in the liquids. As a result, a permanent irritation of the mucosa is observed in the ulcerous patient, and the condition has been designated in a general way as "gastroduodenitis". This irritating effect on the gastric mucosa may be complicated later on by the presence of bacteria, which aggravate the inflammatory symptoms. Symptoms of irritation and inflammation are constantly observed in the affected persons, and their presence constitutes the typical clinical ulcerous ailment, in which pain is felt rhythmically during the day in relation to the meals; this rhythmic tendency persists the entire year according to the evolution of the disease and under the considerable influence of the economic and moral status of the patient.

The complaint is undoubtedly a psychosomatic illness.

The persistence of hypersecretion and hyperquilia (hyperacidity) is the cause of gastroduodenitis, consequently the defensive or protective resistance of the duodenal mucosa is weakened, favoring thus the formation of the familiar known ulcerations. Later on other well known complications, such as perforations, hemorrhages and degenerations, may appear, completing the evolution of the illness.

The illness develops in four periods: (1) Hypersecretion and hyperacidity; (2) gastroduodenitis; (3) ulceration; and (4) complications.

If the evolution of the illness is closely followed, it is evident that in the first two periods no ulcers appear, and yet the illness exists. It is all a question of time, and of aggravation of the disease. The ulcers will eventually appear. So long as they do not appear, however, the disease cannot be described as ulcerous. Still less can the term "duodenal ulcer" be properly applied, for it would be paradoxical to speak of an "ulcerous illness" when no ulcers exist.

In my opinion, the illness must always be called "ulcerogenic". This conveys the idea that ulcers appear only in a more advanced stage of the disease. It should be noted that in "ulcerogenic" illness there are also two different periods: the first, in which functional phenomena predominate and anatomic injuries are scarce, and the second in which ulcers and their complications appear in full evidence. The first period of the illness could be termed "pre-ulcerous", leaving the denomination "ulcerous" for the second.

From these data it is obvious that gastrectomy performed in the pre-ulcerous period is unwise. In my own experience, when no definite healing or improvement is gained by medical treatment, the procedure of choice is vagotomy complemented by pyloroplasty.

For the period when the ulcer appears in full evidence, leaving no doubt as to its presence or its complications, my experience, accumulated over a great many years, leads me to advise subtotal gastrectomy as the most appropriate operation.

SUMMARY

The gastroduodenal ulcer constitutes the final stage of an illness in which the initial period is characterized by functional troubles but in which ulcerations do not appear. This fact should be taken into consideration and the entity described as "ulcerogenic" instead of "ulcerous", the term generally used.

The ulcerogenic illness develops in several stages among which the first two periods are noted by nonexistence of ulcerations.

RIASSUNTO

L'ulcera gastro-duodenale rappresenta l'ultima fase di una malattia di cui la fase iniziale e caratterizzata semplicemente da disturbi funzionali. Il complesso della malattia—che l'A. definisce ulcerogenica—puo' essere suddivisa in parecchie tappe: e interessante notare come le prime due siano ancora esenti da ulceri.

SUMARIO

La ulcera gastro-duodenal constituye la etapa final de una enfermedad cuyo periodo inicial esta caracterizado por desarreglos funcionales, pero sin ulceracion. Este hecho debe de tomarse en consideracion y la entidad debe de describirse como "ulcerogenica" en lugar del termino "ulcerosa" que es el que generalmente se usa.

La enfermedad ulcerogenica se desarrolla en varias etapas, pero sus dos peridos primeros se caracterizan por la falta de ulceraciones.

SOMMAIRE

L'ulcere gastraduodénal constitue la dernière phase de la maladie dans laquelle la période initiale est caractérisée par des troubles fonctionnels mais dans laquella l'ulcération n'existe pas. Il faut prendre en considération ce fait et l'état doit être décrit comme ulcerogénique et non comme ulcéreux, terme employé généralement. La maladie ulcérogénique se développe en plusieurs temps, dans les deux premières périodes, il n'y a pas d'ulcération.

Spontaneous Pneumoperitoneum—Diagnostic Significance

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MAURICE B. JACOBS, M.D., F.A.C.S., F.I.C.S.
CHICAGO, ILL.

IN THE progress of medicine through the centuries, individual discoveries stand as beacons, lighting the way for the reduction of mortality in acute abdominal disease. The discovery of the x-ray by Roentgen in 1895, provided a means of observing the internal anatomic structures and their functions in the normal or the pathologic state.

However, it was not until 1915 that Popper[1] noted the following correlation: during fluroscopy he observed a sickle shaped zone of radiolucence between the right diaphragm and the upper lobe of the liver in a patient who eight days previously had presented the clinical symptoms of an acute perforation of a peptic ulcer. In the following year, Lenk,[2] a military surgeon, emphasized the significance of intraperitoneal free air in his x-ray findings of abdominal gun shot wounds.

During the ensuing nine years relatively few reports on spontaneous pneumoperitoneum were published. Single cases were reported by Weil,[3] Martin,[4] Kellogg,[5] Dandy[6] and others until a total of 17 accumulated. The first published series of any appreciable number was in 1924 by Vaughan and Brams.[7] In their group, pneumoperitoneum was present in 13 of 15 anatomically proven cases of perforated ulcer.

Pneumoperitoneum may occur spontaneously or may be induced for diagnostic and therapeutic measures. The spontaneous type which occurs with perforation of a hollow viscus is of chief interest in surgical diagnosis.

In our opinion, the spontaneous type may be divided into the *immediate* and the *delayed* forms. In the immediate form, free air which shifts with the patient in different positions is present. The free air within minutes, or a few hours at the most, follows the perforation of a hollow viscus. The most frequent predisposing causes for its occurrence are (Fig. 1):

1. Acute perforation of a gastric or duodenal ulcer.
2. Perforating gun shot or stab wounds of the stomach or intestine.
3. Perforation of a "forme fruste" peptic ulcer.
4. Perforation of a neoplasm of the stomach or intestine.
5. Perforation of an appendix at its base.
6. Perforation of a diverticulum, usually of the left colon.
7. Perforation due to severe blunt trauma to the abdomen.
8. Perforation of the intestinal tract following the ingestion or introduction of foreign bodies.

Other less frequent causes are:

1. Perforation of the intraperitoneal urinary bladder.
2. Perforation of a tuberculous or typhoid ulcer.
3. Perforation during chronic ulcerative colitis.
4. Perforation due to immersion blast injuries.
5. Perforation during gastroscopic examination.
6. Rupture of a distended loop of bowel following a partial or complete obstruction.
7. Perforation of a gangrenous Meckel's diverticulum.
8. Perforation of pneumatosis cystoides intestinalis.

The delayed form manifests itself days or weeks after the occurrence of the initial process. Roentgenologically, the delayed form does not alter its site in the abdomen with change in position of the patient, although the fluid level may shift. This form usually presents itself as an intra-abdominal abscess with a collection of purulent material and by the

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From the Hektoen Institute and the Departments of Surgery, Cook County and Mercy Hospitals; the Stritch School of Medicine, Loyola University and the Cook County Graduate School of Medicine, Chicago, Ill.

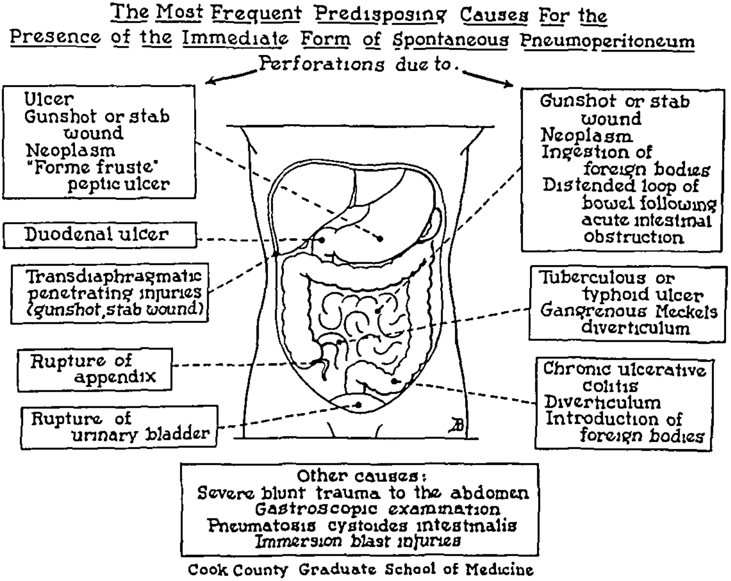
The Most Frequent Predisposing Causes For the Presence of the Immediate Form of Spontaneous Pneumoperitoneum
Perforations due to.
Ulcer
Gunshot or stab wound
Neoplasm
"Forme fruste" peptic ulcer
Duodenal ulcer
Transdiaphragmatic penetrating injuries (gunshot, stab wound)
Rupture of appendix
Rupture of urinary bladder
Gunshot or stab wound
Neoplasm
Ingestion of foreign bodies
Distended loop of bowel following acute intestinal obstruction
Tuberculous or typhoid ulcer
Gangrenous Meckels diverticulum
Chronic ulcerative colitis
Diverticulum
Introduction of foreign bodies
B
Other causes:
Severe blunt trauma to the abdomen
Gastroscopic examination
Pneumatosis cystoides intestinalis
Immersion blast injuries
Cook County Graduate School of Medicine

Fig 1

action of E Coli, alone, or in combination with anerobic staphylococci or streptococci These organisms produce gas that is demonstrable roentgenologically as free air This form is a secondary condition that is present *in cases of subphrenic abscess, peridiverticulitis with abscess, pericholecystic abscess, acute appendicitis with perforation and per*foration of a neoplasm into a previous localized inflammatory zone (Figs 2, 3, 4, 5)

The exact localization of the abscess in this group is of paramount surgical importance, since a knowledge of its anatomical relationship *determines whether an intraperitoneal* or extraperitoneal approach will be the most favorable for drainage Beck, Koucky and Baker[8] have emphasized the value of roentgenological examination of the abdomen for the localization of abscesses

The amount of air that must escape *in order to be visible* was investigated by Paine and Rigler[9] They found that a quantity as little as five cubic centimeters in the right subphrenic space could be visualized fluoroscopically or on the x-ray film Ten cubic centimeters can be seen regularly without difficulty (Figs 6, 7, 8)

The incidence of spontaneous pneumoperitoneum following acute perforation is greatest in lesions of the stomach *and colon* Normally in adults no air is present within the small intestine, however, the lumen of the small intestine of infants and children up to the age of three will, often as a normal finding, reveal air This results from the swallowing of air *and the partial* incompetence of the pyloric sphincter Spontaneous pneumoperitoneum in perforative lesions of the small intestine may not be revealed for a period of several hours following rupture With ileus and secondary gas formation, free air may be demonstrated by repeated fluoroscopic examination

Poer and [illegible] *reported 36* [illegible] with perforat[illegible] intesti[illegible]

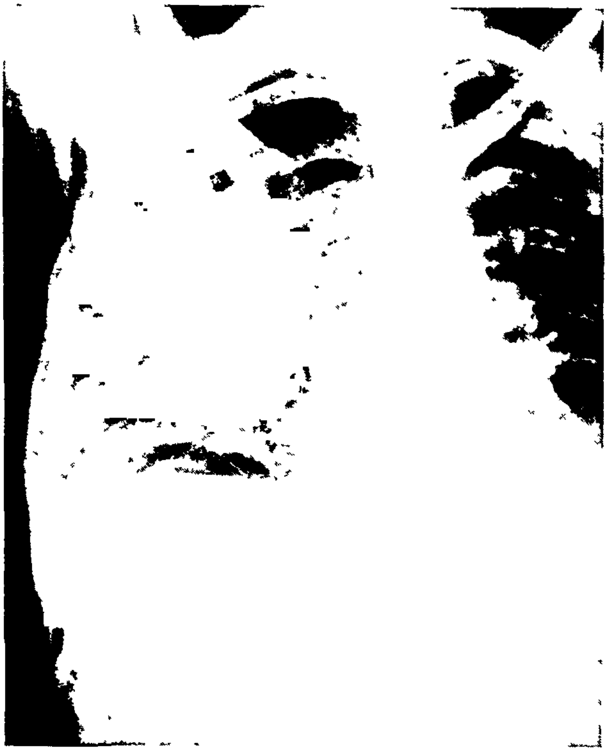

Fig. 2. Roentgenogram showing the anterior-posterior view of a right subphrenic abscess.

stated, "evidences of free fluid or gas within the peritoneal cavity were rare." Unfortunately, they do not mention the number or type of cases which were investigated for the presence of free air. Estes,[11] in their paper advised that roentgenograms be taken for the demonstration of subdiaphragmatic free air. If it is negative, the possibility of intestinal rupture should not be eliminated. On the other hand, Ficarra,[12] in reporting 18 cases of traumatic perforation of the small intestine which were observed at the King's County hospital, said that in 11 patients who were fluoroscoped, six patients or 54.5 percent showed evidence of spontaneous pneumoperitoneum.

The presence of a rigid abdomen and tenderness are not pathognomonic of a perforative lesion of a hollow viscus, for it's well known that such findings are common in non-perforating conditions. We would like to cite a summary of the history in a child who clinically presented the problem of differential diagnosis between traumatic rupture of the intestine, rupture of the spleen or rupture of the kidney.

CASE REPORTS

Case 1: Male, age seven, was admitted to the pediatric surgical service of the Cook County hospital, Aug. 7, 1947 with the history of having been accidentally struck in the epigastrium with a baseball bat and who on physical examination showed all the classical clinical findings of an acute abdomen. On fluoroscopic examination, a minute amount of free air was present in the right subphrenic space which shifted upon changing the patient to the left lateral decubitus position (Figs. 9, 10). Laparotomy was performed and a perforation of the terminal ileum, one centimeter in diameter closed.

The importance of spontaneous pneumoperitoneum to the clinician and surgeon cannot be over-emphasized for invariably it indicates the perforation of a hollow viscus. The exceptions to this are an artificial pneumoperitoneum, tubal insulfation, recent laparotomy and the occasional case of a perforation that

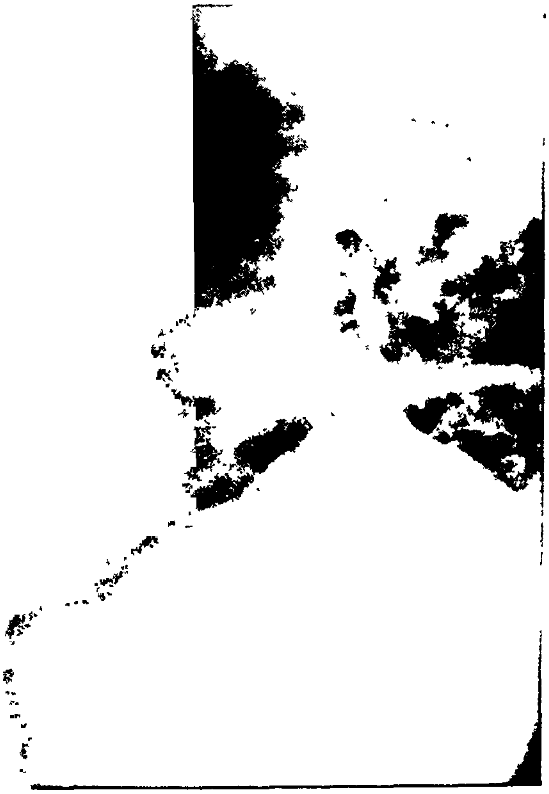

Fig. 3. Roentgenogram showing lateral view of a bilateral subphrenic abscess.

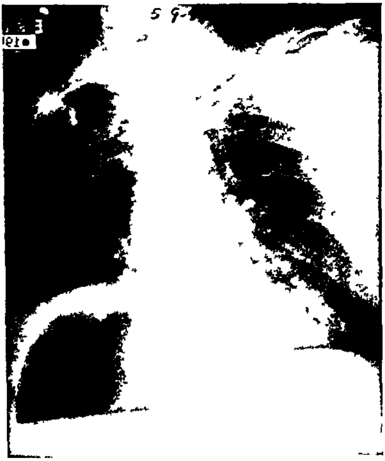

Fig 4 A P view of a right subphrenic abscess showing the fluid level and air From a patient with a perforated appendix who developed this abscess two weeks later

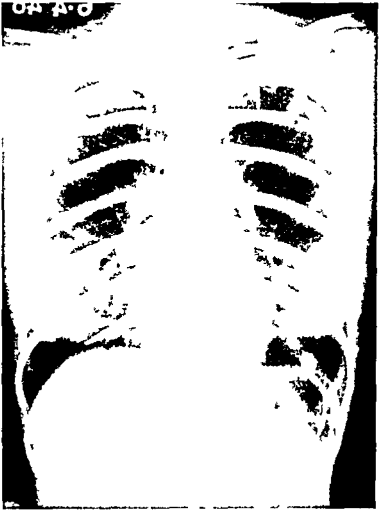

Fig 6 Roentgenogram showing a minimal amount of free air in the right subphrenic space

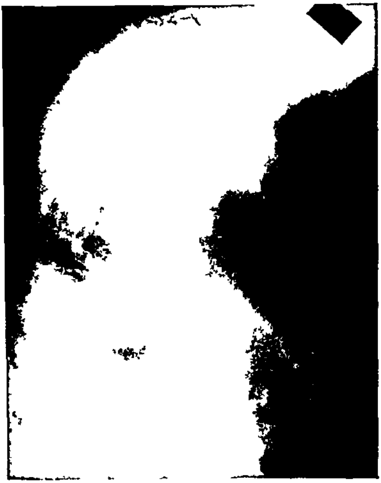

Fig 5 Lateral view of the same patient as in Fig 4

seals itself almost instantly as in the 'forme fruste' peptic ulcer Schindler[14] has reported eight cases of apparent perforation during gastroscopic examination which are manifested by the radiographic demonstration of free air, but on exploratory laparotomy no perforation could be found European literature mentions the condition of pneumatosis cystoides intestinalis, wherein small cysts that form beneath the serosa of the intestine may rupture and give rise to a pneumoperitoneum However, this has not been reported in American literature

The greatest diagnostic aid derived from spontaneous pneumoperitoneum, is in the case of acute perforation of a peptic ulcer Here the positive findings are present in 80 to 85 percent of the cases No one should experience any difficulty in making the diagnosis when the classical symptoms and physical findings are present In a certain percentage of patients the essential [illegible] pat[illegible] [illegible] findings of tenderness [illegible]

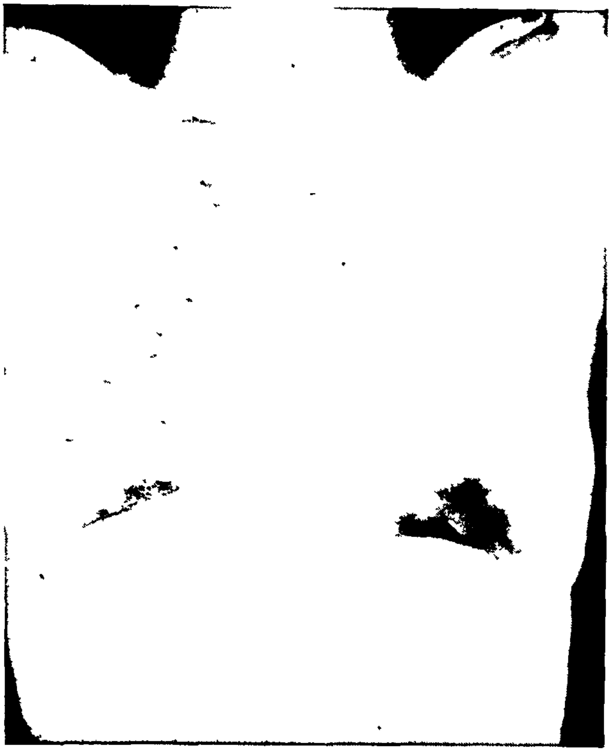

Fig. 7. Roentgenogram showing maximum free air in the right subphrenic space.

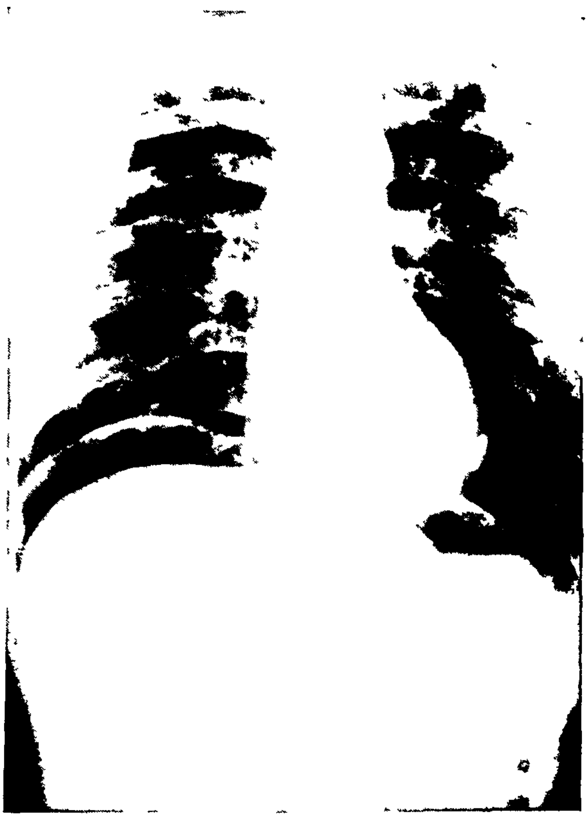

Fig. 8. Roentgenogram showing maximum free air in both subphrenic spaces. Note the fluid level in the stomach.

will be limited to the right lower quadrant; this results from the gravitation of the fluid of the epigastrium down the right colic gutter to the right iliac fossa and clinically simulates acute appendicitis.

In reviewing 400 cases of acutely perforated peptic ulcer operated upon by members of the surgical staff of the Cook County Hospital, it was found that of the 250 patients who were fluoroscoped, spontaneous pneumoperitoneum was present in 205 or 82 percent. A right lower gridiron incision was made in two percent of the patients. On opening the peritoneal cavity the typical "dish water" fluid was found and then it became apparent that the pathology was located in the stomach or the first portion of the duodenum. The late Lord Moynihan[14] reported that of 49 cases of acutely perforated peptic ulcer operated by him, in 18 the incision was made first over the appendix. This is illustrated in the following case history.

Case 2: Male, colored, age 21, was admitted Aug. 4, 1947 to the Cook County hospital, (surgical service of Dr. J. B. O'Donoghue) with a history of sudden severe pain of six hours' duration, in the lower abdomen.

The pain was described as being sharp and of great intensity. Shortly after its onset, the pain radiated over the entire abdomen. At the time of admission, the patient stated that most of the pain was in his right lower abdomen.

On physical examination the temperature was 100 F., pulse rate 96, respirations 18 and blood pressure 128/86. The abdomen was scaphoid and diffusely tender. Definite localized rigidity of the right lower quadrant with marked tenderness over McBurney's point was present. The psoas sign was positive. On rectal examination bilateral tenderness anteriorly was present.

Examination of the urine was negative. The leukocytes numbered 8800 per cubic millimeter with a preponderance of polymorphonuclears. A diagnosis of acute appendicitis was made and the abdomen opened through a right gridiron incision. The appendix and terminal ileum appeared normal. Fluid, best described as "dish water," was present and after aspiration more would appear. The wound was closed and a right paramedian incision was made which revealed a perforated duodenal ulcer

Perforation of a duodenal ulcer often gives the physical findings of a localized right sided peritonitis, whereas a perforation of a gastric ulcer or neoplasm may give the physical findings of a diffuse peritonitis (Fig 11)

To illustrate the manner in which the presence of a pneumoperitoneum comes to the rescue in making an otherwise difficult diagnosis, the following history is cited

Case 3 Male, white, age 61, was admitted to the Cook County Hospital, Aug 8, 1947 with epigastric pain, left shoulder pain and diarrhea of 12 hours' duration The pain which was of moderate intensity at its onset had diminished somewhat when admitted His past history included a venereal disease, 25 years ago

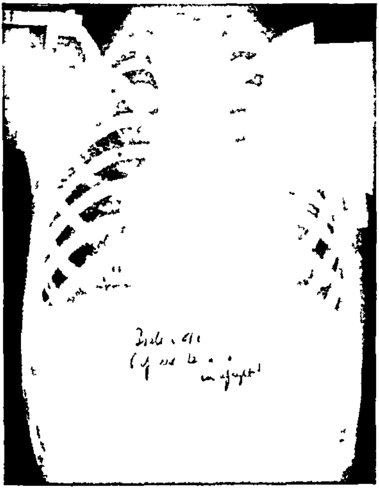

Fig 9 Roentgenogram showing a minute amount of free air in the right subphrenic space

On physical examination the temperature was 101 4 F, pulse rate 104, respirations 30 and blood pressure 100/60 The abdomen was soft and non tender The peristaltic sounds were normal On percussion the liver dullness was obliterated

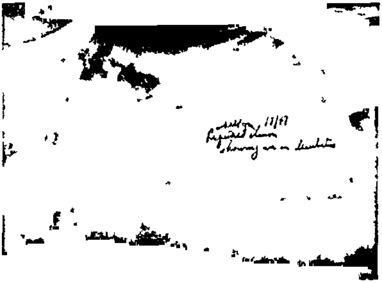

Fig 10 Roentgenogram taken in the left lateral decubitus position showing the presence of free air

Because of the obliterated liver dullness and the sudden onset of epigastric pain, the surgical resident requested a roentgenogram for the presence of free air This was positive (Fig 12)

Reexamination showed Argyll Robertson pupils and absence of the deep reflexes Laparotomy was performed and a perforated duodenal ulcer closed

Another group of patients in whom spontaneous pneumoperitoneum may be demonstrated frequently, are those who have the complication of a perforated neoplasm Mayo Dixon, Rankin and others have found that perforation occurs in approximately 10 per cent of gastro intestinal neoplasms either at the site, or at a point proximal to the growth Our experience has been similar In the great majority of these patients wherein an atypical history and atypical physical findings were presented the x ray is an invaluable aid in the solution of this diagnostic problem

Recently we observed two patients in our surgical ward, one with a carcinoma of the rectosigmoid that perforated at the cecum with the presence of spontaneous pneumoperitoneum, the other patient with a carcinoma of the transverse colon which perforated through a diverticulum located proximal to the neoplasm (Fig 13, 14, 15, 16)

It is our opinion that in acute obstruction of the left colon, with the dilating ability of the cecum and the presence of a functioning ileo cecal valve, the pressure per unit area is greater on the cecum than any other place in the colon and hence the reason for rupture taking place in the cecum

Let us emphasize that one should not depend upon fluoroscopy itself for the demonstration of pneumoperitoneum, but have a flat plate taken in the upright and in the left lateral decubitis positions, since minimal free air may be missed on fluoroscopy and shown on the flat plate. Likewise, air may be missed in the upright position and be shown in the lateral position. This can easily be done by having the patient lie on the hospital cart en route to the operating room without the loss of important time. These films should be taken posterior-anterior, not anterior-posterior (Fig. 17, 18).

In the decade that followed the first demonstration of spontaneous pneumoperitoneum, many surgeons and clinicians deprecated the aid given by the x-ray in the diagnosis of acute perforations. Singer, in an article published as late as 1929, summarized many of the objections presented, e.g. "as unnecessary manipulations of the patient caused by the x-ray examination," or that valuable time was consumed in making the examination. Other surgeons and internists offered no objections to radiographic examination, but stated that they did not need it for diagnosis. To quote directly from Singer's article, is the statement of a colleague who felt that the "x-ray was not practical" and who requested in a case of perforated ulcer an "hourly blood count to determine the presence or absence of a perforative peritonitis." The fluoroscopic examination readily settled the problem.

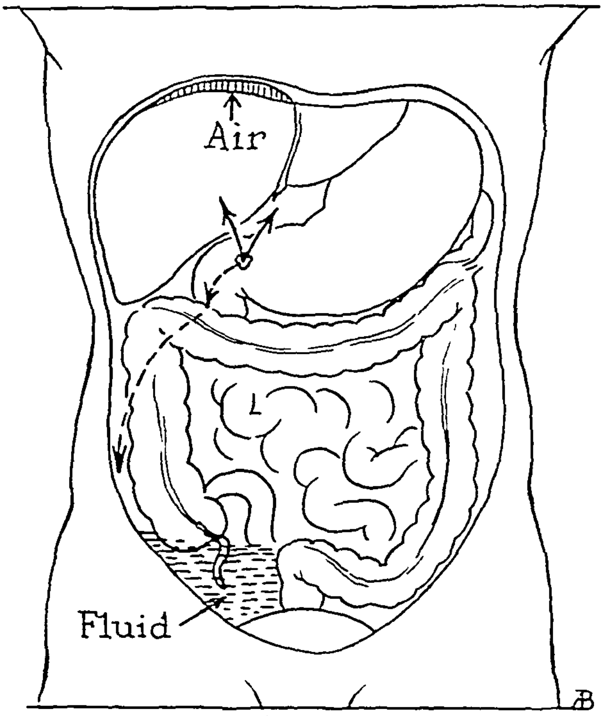

Fig. 11 Diagrammatic illustration of the manner of gravitation of fluid from the epigastrium to the right iliac fossa.

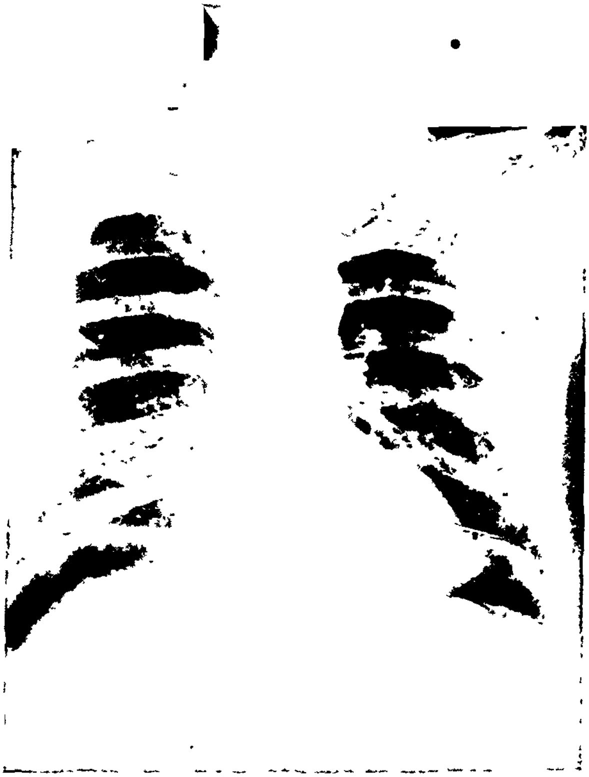

Fig. 12. Roentgenogram showing the presence of spontaneous pneumoperitoneum.

As surgeons we should make the earliest diagnosis possible by the use of every means at our disposal. Without a proper appreciation of the significance of the presence of spontaneous pneumoperitoneum we jeopardize the very existence of those who otherwise could have obtained early surgical aid.

SUMMARY

1. Spontaneous pneumoperitoneum occurs

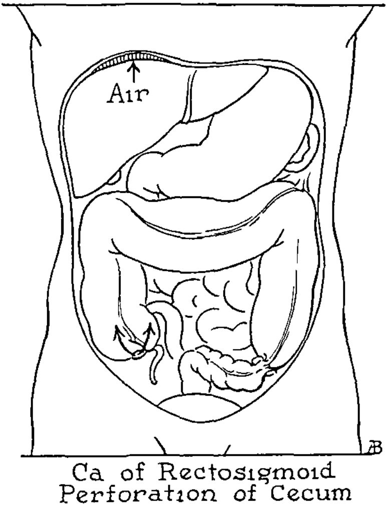

Fig. 13. Diagrammatic illustration of the pathology present in the patient described above.

with the perforation of a hollow viscus and when present is of diagnostic aid.

2. The incidence of its presence is greatest with perforative lesions of the colon and stomach.

3. Spontaneous pneumoperitoneum may be divided into the *immediate* form and the *delayed* form. The former presents itself within a matter of minutes or a few hours. The latter does not present itself for a period of days or weeks after the initial process has occurred.

4. The amount of air necessary for its presence may be as little as five cubic centimeters.

5. In the adult air is not normally present in the lumen of the small intestine. In infants and children up to the age of three, air frequently will be present within the lumen of the small intestine as a normal finding.

Fig. 14. Roentgenogram showing the pneumoperitoneum.

Fig. 15. Barium has been introduced to the point of obstruction.

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In the decade that followed the first demonstration of spontaneous pneumoperitoneum, many surgeons and clinicians deprecated the aid given by the x-ray in the diagnosis of acute perforations. Singer, in an article published as late as 1929, summarized many of the objections presented, e.g. "as unnecessary manipulations of the patient caused by the x-ray examination," or that valuable time was consumed in making the examination. Other surgeons and internists offered no objections to radiographic examination, but stated that they did not need it for diagnosis. To quote directly from Singer's article, is the statement of a colleague who felt that the "x-ray was not practical" and who requested in a case of perforated ulcer an "hourly blood count to determine the presence or absence of a perforative peritonitis." The fluoroscopic examination readily settled the problem.

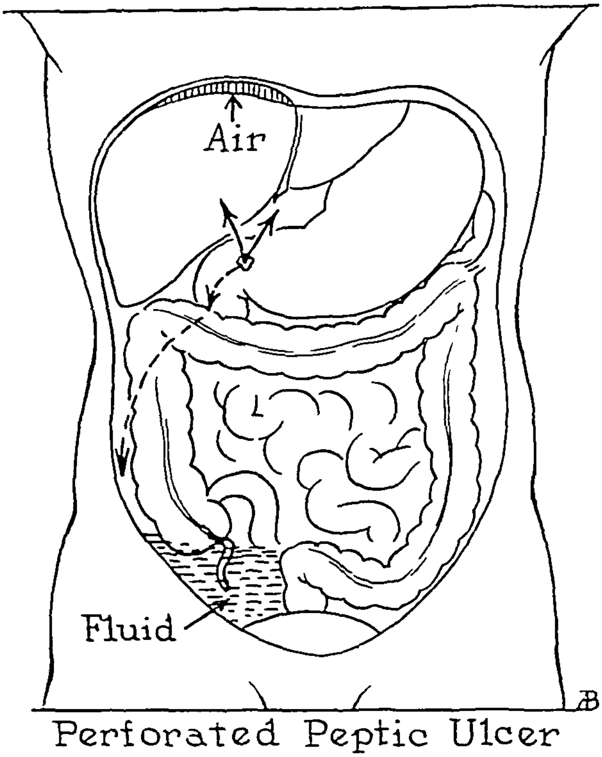

Fig. 11. Diagrammatic illustration of the manner of gravitation of fluid from the epigastrium to the right iliac fossa.

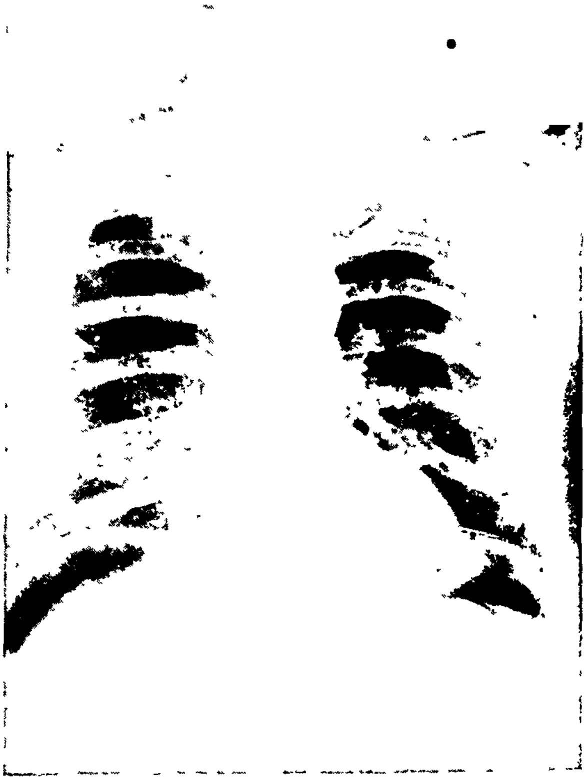

Fig. 12. Roentgenogram showing the presence of spontaneous pneumoperitoneum.

As surgeons we should make the earliest diagnosis possible by the use of every means at our disposal. Without a proper appreciation of the significance of the presence of spontaneous pneumoperitoneum we jeopardize the very existence of those who otherwise could have obtained early surgical aid.

SUMMARY

1. Spontaneous pneumoperitoneum occurs

SUMARIO

1. El neumo peritoneo espontaneo resulta de la perforacion de las visceras que comunican con el exterior, por lo tanto cuando se presenta es de valor diagnostico

2 Su incidencia es mas comun en las perforaciones del estomago o de las del colon

3 El neumo peritoneo espontaneo se puede dividir en una forma inmediata y en forma tardia La inmediata occurre en minutos o en pocas horas La tardia generalmente se presenta despues de un periodo de semanas

4 La cantidad de aire puede ser tan poca hasta no ser mas de 5 cc

5 En el adulto el aire no se presenta normalmente en el intestino delgado En cambio en la infancia hasta la edad de tres anos es una manifestacion normal del intestino delgado.

6 En el 80 a 85% de los casos de perforaciones agudas del estomago o del duodeno se presenta el neumo peritoneo espontaneo

7 La tecnica para demostrar esta complicacion es simple y requiere poco tiempo

SOMMAIRE

1 Le pneumo péritone spontané survient après la perforation d'un viscère creux et facilite le diagnostique de la lésion causale

2 L'incidence de cette condition est plus fréquente avec les lésions perforatives du colon et de l'estomac

3 Le pnélopéritome spontané peut être divisé en forme immédiate et en forme retardée La forme immediate se manifeste au bout de quelques minutes ou de quelques heures La forme retardée ne se présente qu'après une semaine ou plus apres l'occurence de lesion causale initiale

4 La quantité nécessaire pour révéler la présence d'air dans le péritoine, peut être aussi petite que 5cm3

5 Chez l'adulte, l'air n'est pas normalement présent dans le lumiere de l'intestin grêle Chez l'enfant jusqu'à l'âge de trois ans, l'air fréquemment est présent dans la lumière de l'intestin grêle et est normal

6 *Dans les perforations aigues de l'estomac* ou du duodénum, on recontre le pneumopéritoine spontané dans 80 a 85% des cas

7 La technique pour la démonstration de cette complication est facile etre prend que peu de temps

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duce the caliber. The end-to-end anastomosis performed in all these cases "takes" successfully, without technical complications of loss of circulation, loss of viability of the apposed ends, or fistulization.

In the cases presented in this paper I am dealing with a particular problem encountered in the emergency service of a charity hospital. The patients are chronically undernourished, with untreated vitamin deficiencies of long standing.

ETIOLOGIC CONSIDERATIONS

In most cases, mesenteric vascular thrombosis occurs in young or middle-aged persons. Prior to the onset they notice nothing more than *mild dyspepsia Jackson Porter and* Quimby found an equal percentage of cases in which the course was prolonged as much as *eight days, and an equal number of far shorter* periods. In my experience, distention, vomiting or diarrhea need not be prominent. It is possible that climatic conditions and the common incidence of lymphatic diseases in Puerto Rico may account for this.

Occlusions of the mesentery or the intestinal walls may consist of multiple emboli or multiple thrombi. In cases of the acute condition there may be preponderance of either lesion with evidence of the other.

The etiologic factors producing thrombotic occlusion of the small intestine are: (1) postoperative trauma to the mesentery; (2) mechanical strangulations by volvulus, hernia, or kinks; (3) stenosis of the portal system; and (4) lymphoblastoma (*Hodgkin's* lymphogranuloma).

The etiologic factors involved in the forma*tion of emboli seem to be acute processes:* (1) acute bacterial endocarditis; (2) any disease that disseminates emboli through the circulation, such as (a) staphylococcus septicemia or (b) acute ulcerative enteritis; (3) atheromatosis of the aorta; and (4) premature arteriosclerosis.

REPORT OF CASES

Case 1: C. C., a white woman aged 21, was admitted to the Medical Service with pain in the left upper abdominal quadrant. Her main symptoms were vomiting, high temperature, diarrhea and abdominal distention, which would totally disappear with Wangensteen suction. The leukocyte count was 15,000 per cubic millimeter of blood, but the differential count was normal except for 15 percent eosinophils.

Roentgen diagnosis of a flat plate of the abdomen gave positive clinical evidence of intestinal obstruction.

Exploratory laparotomy revealed an extensive edematous process of the jejunum. There was a mechanical obstruction (due to edema) from the ligament of Treitz onward to a distance of about 30 cm. There was extensive lymphoid hyperplasia. The degree of mucosal edema was such that the serosa of the intestine became blotted out by a violaceous circular area, and the walls were thick and leathery. The capillary surface of the intestinal serosa was profusely mapped out after formalin fixation, and the bluish color tended to persist. A resection of about 1 foot of intestine was made (Fig. 1).

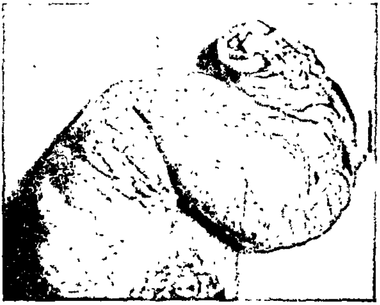

Fig. 1. Gross specimen. Note congestion of the serosal veins, signifying mesenteric thrombosis. Preservation of the specimen in solution of formaldehyde showed both capillary and venous congestion, indicating vascular embolism of a segment of the intestine.

After operation the patient had similar and progressive symptoms—a highly sustained fever, toxemia, and signs of peripheral vascular collapse —but these were not necessarily postoperative complications.

Pathologic Report: The gross *specimen* was a segment of small intestine 23 cm. long. The serosal surface was intensely congested and covered with a thin layer of fibrin at its central portion for a distance of approximately 8 cm. The mucosa was intensely congested and hemorrhagic in the central portion of the segment, corresponding to the area covered on the outside with *fibrinous matter. Some* pieces of vegetable matter were still adherent to the mucosal surface. The mucosa was intensely edematous proximal to the lesion, but its appearance distal to the lesion was normal (Fig. 2). The appendix measured 10 x 0.5 cm.

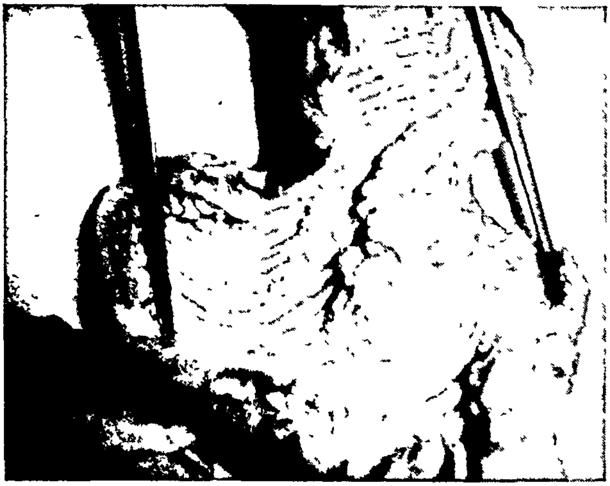

Fig. 2. Intense mucosal edema of the intestine (same specimen as in Figure 1). Note thickening of walls.

For microscopic study, jejunal sections were taken from the central portion of the segment. These showed two fairly large wedge-shaped areas of hemorrhagic necrosis involving the mucosa and submucosa, and one of these included a small abscess. These areas exhibited arterioles and venules with extensive necrosis of their walls and early thrombosis. The adventitial tissue of the affected vessels showed a compact exudate of neutrophils, which were also infiltrating the necrotic walls, simulating minute abscesses. The remainder of the intestinal coats were edematous, congested and diffusely permeated by neutrophils, eosinophils, lymphocytes and a few plasma cells. A process of repair was noted, particularly in the submucosa, manifested by marked proliferation of fibroblasts and neoformation of capillaries. The two specimens were essentially similar. A third specimen, taken from the proximal extremity of the segment, showed moderate edema of the mucosa and submucosa.

Diagnosis: The anatomic diagnosis was mechanical intestinal obstruction (jejunal) due to infarction.

Case 2: J. R. O., a white girl aged 18, was admitted to the hospital on Oct. 24, 1946. There was a history of fever and of abdominal distention, relieved at times by Wangensteen decompression. The patient was acutely ill, her condition resembling typhoid. Surgical examination revealed severe strangulation and intestinal edema. The patient died of fulminating toxemia on the third postoperative day. The clinical diagnosis was strangulation edema of the jejunum.

Pathologic Report: The gross specimen was a segment of small intestine measuring 86 cm. in length, with thickened walls somewhat rigid. The serosa had lost some of its normal luster and was spotted irregularly by reddish and violaceous areas usually localized circularly around the circumference of the bowel. There was a soft, reddish, round area in the walls of the intestine localized 30 cm. from one extremity of the bowel and closed to its mesenteric attachment. These areas measured approximately 2.5 cm. in diameter. On section the walls of the bowel at this point were soft, reddish-brown and necrotic; this area was covered by a yellowish fibrinopurulent exudate. Its lumen contained reddish sanguinous fluid. The mucosa was dark red and edematous; in some areas it was greenish with bile pigment. The dark red mucosa was about half of the entire thickness of the intestinal wall. The regional lumph nodes were hyperemic.

Microscopic sections were taken at different levels of the intestinal segment. They showed patchy areas of necrosis of the mucosa, which in places extended to the inner layer of the muscularis. A third section showed a large infarct involving all the coats of the bowel. Many embolic thrombi were found in arterioles of the submucosa and mucosa. There was a pyogenic reaction underneath and about the areas of necrosis. The submucosa was edematous and closely infiltrated with lymphocytes, neutrophils, eosinophilic hystocytes, plasma cells and eosinophils; this cellular reaction was heavier about the blood vessels. A similar but milder exudate was present throughout the muscularis and serosa. The collagenous stroma in the submucosa manifested fibrinoid degeneration. Sections from both extremities showed histologic changes similar to those observed in the other two specimens.

The mesenteric lymph node showed a moderately large infarction with a thrombosed vessel toward its center.

Diagnosis: The anatomic diagnosis was multiple septic infarction of the small intestine (jejunum) due to thrombotic emboli of the mesentery and intrinsic vessels of the small intestine; septic embolic infarction of the mesenteric lymph nodes, and edema and acute enteritis secondary to the primary infarction. The origin of the emboli was undetermined.

Case 3: E. R., a 42-year-old mulatto, was admitted to the medical service with severe epigastric

Fig 3A Fig 3B Fig 3C

Fig 3A Small polypoid tags in mucosa, with much edema B Greatly thickened edematous lumen with evidence of thrombosis in submucosa C External appearance of serosa

pain associated with melena There was no previous history of gastrointestinal complaints Physical examination gave negative results except for a suspicious mass in the left upper quadrant of the abdomen, slightly tender on palpation and associated with bloody, bright red stools The patient was dehydrated and had a very high temperature

Chemical laboratory tests gave relatively normal results, which is highly significant The leukocyte count was 10,750 per cubic millimeter of blood, with 72 percent polymorphonuclear cells, 24 percent lymphocytes, 0 3 percent eosinophils and 1 percent basophils The result of the Kahn test was negative Examination of the stools revealed no parasites Urinalysis resulted in a value for albumin of 3 plus

Exploratory laparotomy revealed a rare pathologic specimen, associated with vascular thrombosis and with acute Hodgkin's granuloma of the intestinal variety

On review of the physical signs, there was no suspicion of previous axillary or inguinal adenopathy, not even blood dyscrasia A Vidal test gave negative results The patient died on the fourth postoperative day, with symptoms of impending uremia and fulminating toxemia unabated by antibiotics or supportive medication

Pathologic Report The specimen was a segment of the jejunum that occluded the duodenum This patient had multiple jejunal infarctions and extraordinary mesenteric lymphadenopathy, and the mucosal folds were invaded by a typical polypoid tag (Fig 3)

A piece of intestine measuring 57 cm in length was removed from the duodenojejunal area The intestine was thickened uniformly for the first 30 cm The subsequent portion of the jejunum appeared ecchymotic in places There was much edema of the lumen of the intestine, particularly in the proximal portion The mesenteric lymph nodes were markedly enlarged

Microscopically, the walls of the small intestine, particularly the mucosa, submucosa and circular layer of the muscularis were occupied by a large hemorrhagic infarct The mucosa had undergone complete anemic necrosis the submucosa was infarcted with blood and the circular coat of muscularis included extensive areas of more recent hemorrhage Necrotic changes were also evident in these two layers and in the muscle fibers of the longitudinal layer of the muscularis Embolic thrombi were found in the capillaries and small arterioles of the various coats of the intestine The mesenteric lymph nodes exhibited the granulomatous changes of Hodgkin's disease

Diagnosis The anatomic diagnosis was Hodgkin's disease of the mesenteric lymph nodes, infarction of the small intestine due to mesenteric thrombosis and enteritis of undetermined cause

The following cases are of those patients with acute abdominal symptoms who were also examined on the basis of a clinical impression of regional enteritis Note the comparative incidence in a year's time, and also the fact that, in spite of the interesting histopathologic description, systemic fulminating toxemia of multiple thrombosis did not develop in these patients

Case 1 A young girl complained of acute abdominal pain associated with severe leukocytosis and vomiting There was some history of melena before admission

Resection of a mesenteric thrombus (Fig 4) and a corresponding infarcted lumen of the intestine was performed The operation consisted in resection of the diseased ileum and creation of an end-to-end anastomosis Recovery was uneventful

Case 2 S R, a white man aged 27, was admitted to my service in the hospital on Jan 1

1946, with excruciating abdominal pain of several days' duration. He appeared to be in an acute phase of regional jejunitis with mesenteric adenopathy. Surgical exploration revealed regional jejunitis. Resection of 5 feet of the diseased intestine was performed, followed by an end-to-end anastomosis. The patient recovered uneventfully.

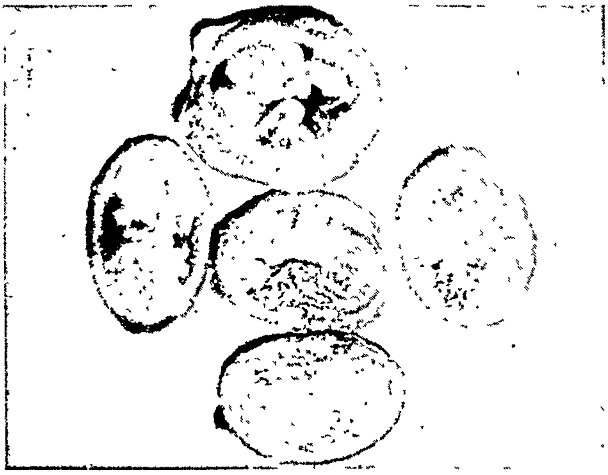

Fig. 4. Sections of intestine showing the lumen, with a thrombus on the mucosa (Case 4).

Pathologic Report: The gross specimen was a segment of small intestine, devoid of its mesenteric attachment and measuring 13 cm. in length. The serosal surface was slightly opaque and covered along the mesenteric attachment with a thin brownish fibrinous layer. The mucosa was moderately edematous, and the summits of the mucosal folds were grayish pink. There was slight to moderate thickening of the submucosa, muscularis, and serosa. Small pieces of greenish vegetable matter were found between the mucosal folds, mixed with mucus. Small areas of hemorrhage were seen in the mucosa and submucosa on section. A soft, swollen appendix measuring 10 x 1 to 1.5 cm. was observed. The serosa was opaque and the subserosal vessels congested. The lumen of the organ was dilated and filled with soft yellowish matter.

Microscopically, the jejunum showed large areas of hemorrhagic infarction at various levels, involving chiefly the mucosa and submucosa. The affected areas were partly bordered by an acute leukocytic reaction and large areas of hemorrhage. The mucosa was edematous, hyperemic, hemorrhagic and diffusely infiltrated with neutrophils, eosinophils, lymphocytes and a few plasma cells. The lymphatics and blood channels of the submucosa were dilated. The inflammatory reaction was more severe about the blood channels. The walls of some of the arterioles were infiltrated with neutrophilic leukocytes. Small thrombosed blood channels were seen in the submucosa at the base of the area of hemorrhagic necrosis. The muscularis, particularly

Fig. 5. Infarction of the jejunum (Case 5). Note the edematous submucosa of the bowel wall.

the external liver showed early degenerative change A section taken from one of the extremities or surgical cuts of the intestine showed mild to moderate inflammatory reaction of the mucosa submucosa muscularis and serous coat and vascular dilatation of the submucosa The appendix showed mild inflammatory reaction of the serous coat

Diagnosis The anatomic diagnosis was infarction of the jejunum due to circulatory disturbance (Fig 5) enteritis of undetermined cause probably secondary to infarction, and periappendicitis (reactive peritonitis)

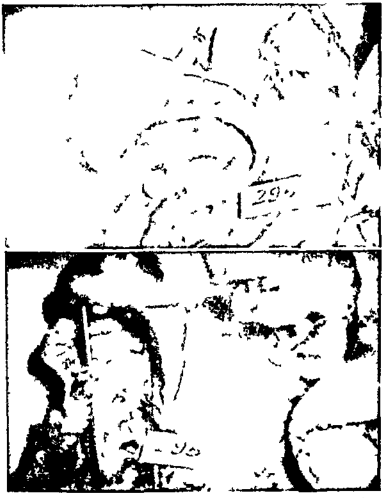

Fig 6 Jejunal infarction due to circulatory disturbance, associated with enteritis (of undetermined cause but probably secondary to infarction) and periappendicitis (reactive peritonitis)

Case 6 C E S, a white girl 12 years old, had acute intermittent gastric pain and some vomiting Food increased the pain The condition was tentatively diagnosed as intussusception A segment of small intestine 90 cm long, with much obstructive edema and multiple hemorrhagic jejunal infarcts was resected Recovery was uneventful The submucosa of the bowel wall was thickly edematous (Fig 6)

Pathologic Report The gross specimen presented several small hemorrhagic infarcts, involving principally the mucosa and localized toward the center of the specimen Otherwise its general appearance was normal

Microscopically four sections were studied The first showed a moderately large wedge shaped area of hemorrhagic infarction toward the center, involving the mucosa the submucosa and a portion of the circular muscle coat It was rimmed by an exudate composed of neutrophils and a few lymphocytes mingled with eosinophils The surrounding tissues were congested and edematous The other three specimens showed slight congestion of the veins and capillaries and some dilatation of the lymph vessels

Diagnosis The anatomic diagnosis was slight hemorrhagic infarction of the jejunum

SUMMARY

Experience with surgical pathologic conditions of the small intestine especially regional enteritis and vascular thrombosis is presented Histopathologic as well as clinical differential diagnosis are discussed It is emphasized that vascular thrombosis of the small intestine is not an inevitable cause of death in young persons

A theory is advanced that the etiologic factor need not be any specific organism but that the disease behaves similarly to schistosomiasis, tuberculosis Hodgkin's granuloma sarcoid and bacterial infection, with a granulomatous reaction that injures the lymphatic circulation

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A Radical Treatment for Inguinal Hernia[*]

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INGUINAL hernia, without doubt, has been the most discussed subject in surgical annals. There is seldom a Surgical Congress without at least one paper dealing with some aspect of hernia repair. Whenever a group of physicians assembles for a general surgical discussion, someone will surely introduce his experience with herniorrhaphy. Most of what is said is not new. To illustrate, allow me to refer you to the instance of the presentation of papers by Martin[9] and Collins[3] before the Southern Surgical Association in 1941; followed by a discussion by such authorities as Charles R. Robins, William Reinhoff, Bradley S. Coley, Charles Green, Duval Jones, Amos Koontz and John E. Cannaday.

Perusal of what was said in that meeting demonstrates without danger of refutation that even among outstanding surgeons there is no unanimity of opinion as to what constitutes the proper operation to cure an inguinal hernia. Recurrence of a repaired hernia has been frequently blamed on the use of absorbable sutures, and yet silk, cotton and various plastic sutures are regularly found buried in some of the most troublesome recurrent hernias. The progress that has been made in surgery generally is the result of careful and detailed study of failures and successes alike, always hopeful that in the next case the experience already gained will make possible a more perfect result. With such a background, I do not feel immodest in describing a procedure which, in our hands, has proven extremely satisfactory, whether one is dealing with a simple hernia or one which is complicated by strangulation or recurrence of a previously repaired hernia.

It was estimated that for some years prior to the recent war, 10 percent of surgical treatments in hospitals in the United States were for cure of inguinal hernia. It has been further stated that approximately 10 percent of the male population of the United States has, or has had, an inguinal hernia. In terms of manpower for military purposes, therefore, inguinal hernia is a major problem, in that the man with a hernia does not make an acceptable soldier. The full significance of this statement could be witnessed by surgeons in military hospitals adjacent to Army reception centers during World War II, where inductees with observed hernia were immediately transferred for operation prior to active duty and where many more soldiers arrived with previously unnoted hernia, detected during the strenuous exercises of Army training.

For those who have undergone herniorrhaphy, as well as for those whose abdominal structures potentially lend themselves to the development of inguinal hernia, the physical requirements of soldiers are a real proving ground in determining whether there will be recurrence of a repaired hernia, or the development of hernia in the structurally weak abdominal wall. Even today, a large number of veterans admitted to Veterans Hospitals for elective surgery carry the admission diagnosis of "inguinal hernia." Recently, a number of recurrent inguinal hernias were carefully scrutinized to discover, if possible, why former operations had failed.

Among the cases of recurrent hernia examined, the Bassini[1] technic had been most often employed, although a lesser number had had the Halsted or Ferguson method of repair at their previous operations. The findings were varied, but resulting opinions are consistent with an editorial[4] in the United States Naval Medical Bulletin: "A hernial operation is a plastic operation of the highest order, demanding not merely an appreciation of simple esthetic approximation of tissue, but a thorough knowledge of the architectural mechanics involved. It is not surprising that failure should follow a procedure that is founded on unsound anatomic and physiologic principles."

Two factors seemed prominent in contributing to the recurrence of these inguinal hernias.

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It was noted that occasionally a hernia sac of small dimension had been overlooked or was incompletely obliterated In certain instances apparently a "pantaloon sac had existed when at operation only the indirect or lateral sac had been treated and the medial sac was unobserved The second and more prominent factor in the recurrence of the hernia was that at the first herniorrhaphy a bridge had been constructed across a deficient portion of the lower abdominal wall at the inguinal canal, by transplanting a rudimentary or fragile conjoined tendon to cover the defect This transplant was reinforced by the overlying rigid, unyielding aponeurosis of the external oblique muscle, which, under strain, had been forced to "give but which did not have the elasticity to retain its integrity

From the same editorial cited above, we quote "Furthermore it has been pointed out that an intact falx inguinalis aponeurosis or the so called conjoined tendon is present in less than 20 percent of the individuals Any operation therefore founded upon such an inconstant structure as the conjoined tendon is doomed from the start to failure proportionate to the presence of that structure Add to this the personal error of the surgeon s failure to recognize the structures before him and the lack of appreciation of the etiologic factor productive of a hernia and the appalling high ratio of recurrence is easily understood

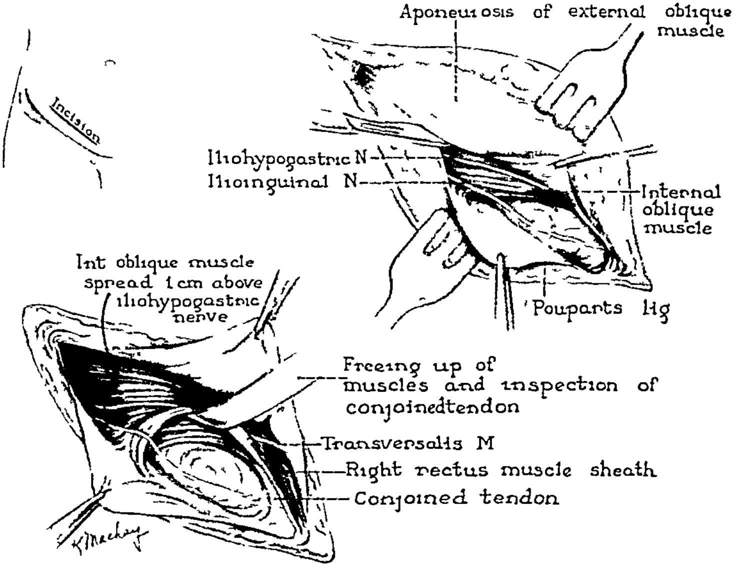
Aponeurosis of external oblique muscle
Incision
Iliohypogastric N
Ilioinguinal N
Internal oblique muscle
Pouparts lig
Int oblique muscle spread 1 cm above iliohypogastric nerve
Freeing up of muscles and inspection of conjoinedtendon
Transversalis M
Right rectus muscle sheath
Conjoined tendon
KMackey

Fig 1 Anatomic illustration to show the location of incision and steps of dissection approaching the peritoneum (The drawing shows the muscle splitting above the iliohypogastric nerve The extreme variability in the course of the iliohypogastric and ilioinguinal nerves usually requires that the muscle split occurs in interval between the two nerves)

Certain surgeons have emphasized the importance of the transversalis fascia in hernia repair, and rightly so, but here again, any operation dependent for its success on such an irregularly potent structure as the transversalis fascia will experience inconstant results. It is necessary then to look upon herniorrhaphy as an extremely technical procedure, and one should not be considered capable of undertaking the operation until he is thoroughly conversant with the variations in the anatomy involved.

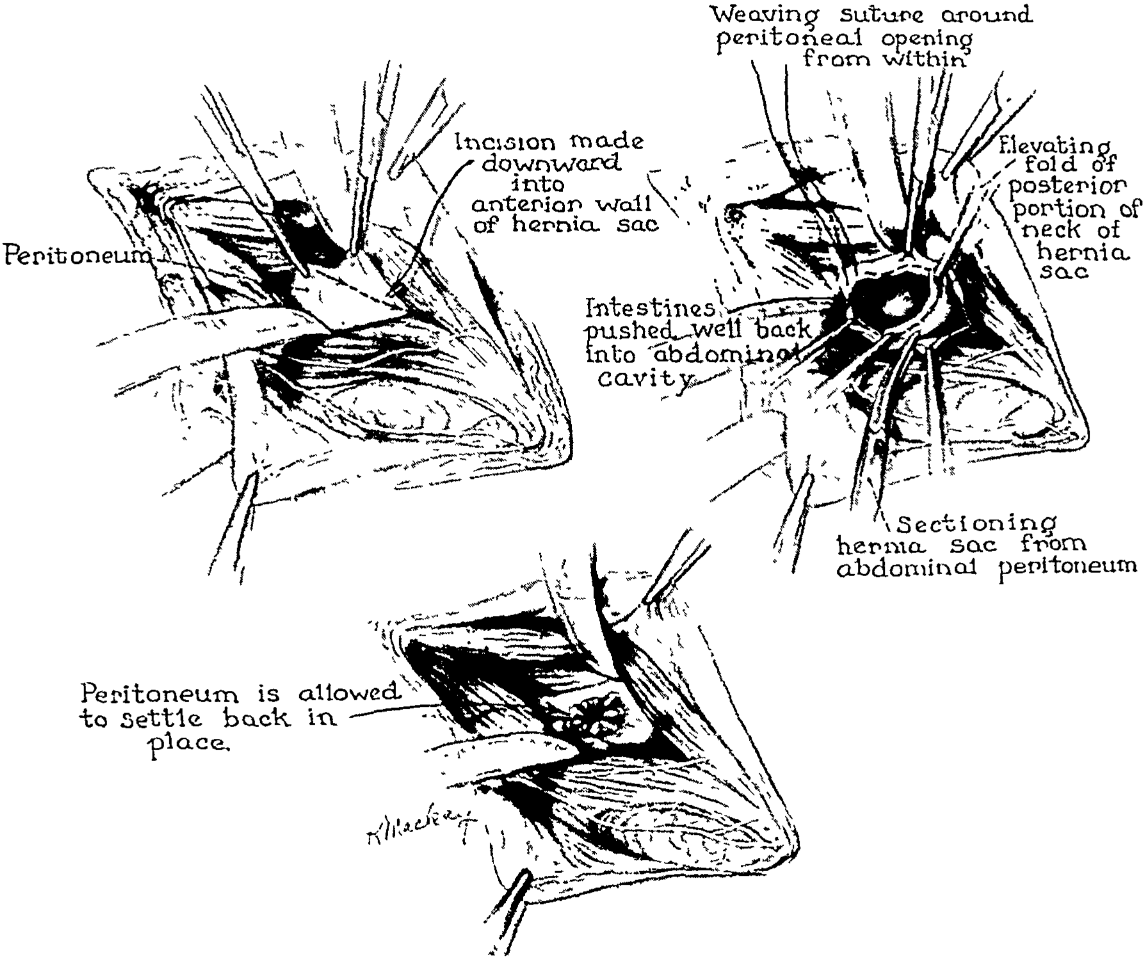
Peritoneum
Incision made downward into anterior wall of hernia sac
Weaving suture around peritoneal opening from within
Elevating fold of posterior portion of neck of hernia sac
Intestines pushed well back into abdominal cavity
Sectioning hernia sac from abdominal peritoneum
Peritoneum is allowed to settle back in place.

Fig. 2. Anatomy illustration to show method of opening the peritoneum, exposure of the hernia sac and closure of the peritoneal cavity after excision of the hernia sac.

The foregoing discussion is the prelude to the presentation of a method of herniorrhaphy designed to overcome objections to other methods of operation and combine what seem to be the most valuable procedures available. In the experience of those who have mastered this technic, the entire operation seems to have been simplified. They now have difficulty in performing one of the "standard herniorrhaphy" operations to their satisfaction. We[8] have previously described the procedure of locating and disposing of the peritoneum-lined sac, which is an adaptation of an original technic described by La Roque.[6] Williams[10] has discussed this same approach to the hernia sac from within the abdomen and later fully described its advantages, especially in dealing with the difficult sliding hernia of the cecum or sigmoid[12]

PROCEDURE

After making the usual skin incision two fingerbreadths medial and parallel to Poupart's ligament, from a point opposite the anterior superior iliac spine to a point over the pubic tubercle, Scarpa's fascia is opened and the underlying aponeurosis of the external oblique muscle is cleared medially to the lateral border of the rectus sheath and laterally to Poupart's ligament, so that the external inguinal ring is plainly visible below and the junction of the aponeurotic fibers and muscle bundles of the external oblique can be seen above Then the aponeurosis of the external oblique is carefully incised upward from below beginning just medial to the midpoint of the external inguinal ring and extending the entire length of the aponeurosis The two leaves of the aponeurosis thus made by the incision are freed medially to the lateral edge of the rectus sheath and laterally to the fold forming Poupart's ligament The lower border of the internal oblique muscle is outlined and gently freed from the spermatic funiculus The conjoined tendon is also inspected, noting its extent and structure (One seldom finds a conjoined tendon which resembles the structure as described in the anatomy text[2]) Complete absence of the lower muscle fibers of the internal oblique whose medial insertion principally forms the fibers of the conjoined tendon is frequently noted)

The branches of the iliohypogastric and ilioinguinal nerves are observed but not disturbed At a point about 1 cm above the usual course of the ilio inguinal nerve the internal oblique muscle is spread in line of its muscle bundles and the peritoneum is approached as with the McBurney gridiron technic for appendectomy The peritoneum is opened and the incision is extended downward into the anterior wall of the hernia sac, which can be seen easily in the indirect hernia and palpated in the direct hernia In the instance of the indirect hernia sac a hemostat is placed on the medial and lateral expansions of the 'peritoneal ring and while traction upward is made on these clamps the sac is excised just distal to the peritoneal ring" On the other hand, in the case of the direct hernia sac the exploring finger introduced into the peritoneal cavity, locates the bulging peritoneum and by lifting this peritoneum upward the bladder and extra peritoneal tissues are wiped downward, obliterating the direct hernia sac Under ordinary circumstances the vas deferens and spermatic vessels are observed as they ascend from the pelvis but are not disturbed unless they adhere to extraperitoneal adventitia of the sac Then the peritoneal cavity is closed by weaving a suture around the opening in the peritoneum from within being careful not to include any extra peritoneal structures (with special reference to catching only the serosal covering of the bladder in the direct hernia sac)

Under gentle traction the peritoneum is closed as the "purse string' is drawn and tied No effort is made to excise the peritoneal collar which projects beyond the suture The peritoneum is allowed to settle back in place while the aperture in the overlying muscle layers is closed by two or three loosely tied sutures which include the transversalis fascia in the bite If the indirect sac is long or extensive it is incised longitudinally as far as the pubic tubercle and the two edges thus made are tacked under the cremaster muscle by a few interrupted sutures so that in subsequent steps the serosa lining the sac will be in apposition to the under surface of the internal oblique muscle

At this point it is necessary to plan the architecture of the future inguinal canal based upon examination of the developmental status of the structures involved Silk sutures *are inserted through the lower edge of the internal oblique muscle and the shelving border of Poupart's ligament downward from above in a position of approximation without tension* The last approximating suture is inserted at the junction of the conjoined tendon and the internal oblique muscle fibres These sutures are not tied, but caught in a clamp and laid aside to act as guides during the insertion of aponeurotic suture as follows A strip of medial leaf of the aponeurosis of the external oblique about 0 5 cm in width is freed downward from above and left firmly attached abo [illegible] ubic [illegible] rcle This strip of aponeu-

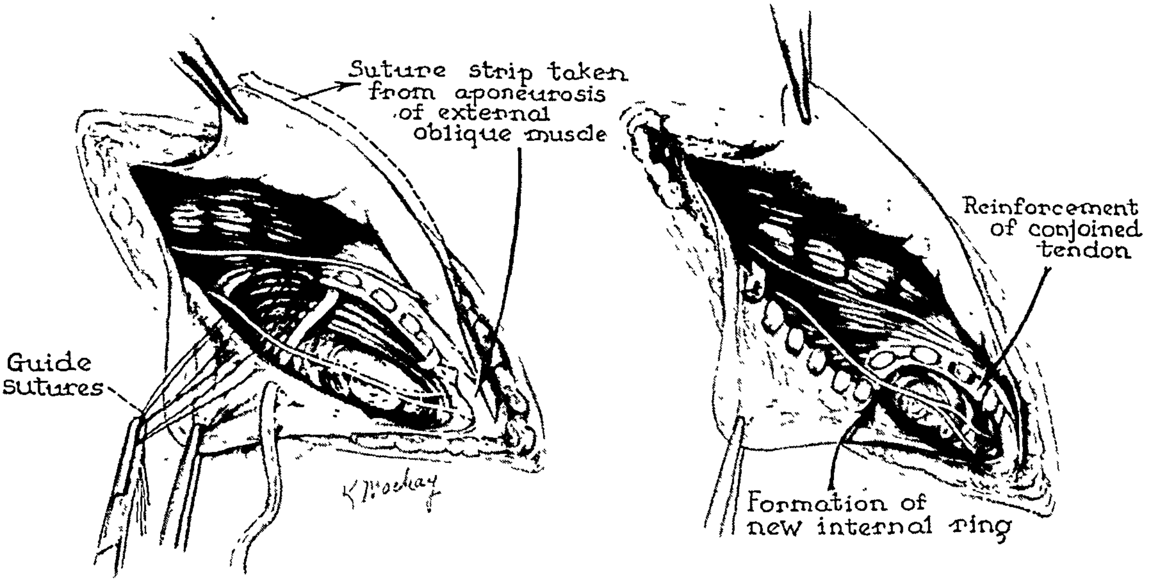
Suture strip taken from aponeurosis of external oblique muscle
Guide sutures
Reinforcement of conjoined tendon
Formation of new internal ring

Fig. 3. Anatomy illustration to show method of approximation of the internal oblique and transverse abdominal muscles to Poupart's ligament by insertion of silk guide sutures before reconstruction of the internal inguinal ring; also, method of applying a strip of aponeurosis as a suture in reforming the internal inguinal ring and reinforcing the conjoined tendon.

rosis is threaded into a fascia needle and the remodeling of the inguinal region begun.

Beginning at the public tubercle, the first bite of the needle dips deeply so as to catch a firm hold in the transversalis fascia and, in completing the stitch rolls the fascia under whatever remnant of the conjoined tendon is found.

This procedure of plicating the transversalis fascia with the aponeurotic strip continues, either reinforcing the conjoined tendon or creating one until the lowest approximating silk suture is approached at the junction of the internal oblique muscle fibers and the conjoined tendon. Here the fascia needle is passed through the shelving border of Poupart's ligament at the point designated by the lowest approximating silk suture. One can now observe that a new internal ring has been formed, composed of the tucked-up transversalis fascia, the remnant of the conjoined tendon and the strip of aponeurosis, which arches over the spermatic funiculus without tension and yet obliterates the "weak space," without constricting the spermatic cord and its vessels. From here, the strip of aponeurosis is continued as an over, and, over suture, making alternate bites in the combined internal oblique and transversalis muscles and the shelving border of Poupart's ligament, approximating muscle to ligament firmly without tension. This strip of aponeurosis is finally anchored to Poupart's ligament with a fine silk mattress suture. The silk guide sutures may either be tied or removed, the latter being preferable in most instances. (By comparison one now observes an inguinal canal that resembles that described in the anatomy text.[2])

The remainder of the operation consists of a simple approximation of the cut edges of the aponeurosis of the external oblique muscle downward from above, finally constructing the new external inguinal ring loosely about the spermatic funiculus, imbricating only the lowest fibers Scarpa's fascia is closed by approximation of the cut surfaces, as is also the skin, with fine silk sutures.

In conclusion, a brief statement is submitted of the advantages derived from the use of the herniorrhaphy method just described. A wide dissection of the inguinal region permits a survey of the anatomic structures involved and an estimate of the plastic procedure required for a firm abdominal wall at its completion By entering the peritoneal cavity through direct approach, the hernia sac is located with ease, especially with reference to the small sac, the direct sac or the combination 'pantaloon" sac In each instance the hernia sac can be obliterated more completely without endangering adjacent structures, from within the peritoneal cavity than by any other method (It is apparent that the peritoneal cavity is shortened in the inguinal region)

In the case of strangulated or incarcerated hernia, the viscus or omentum concerned is completely under control before being released from the hernia sac and can be readily delivered on the abdomen with a minimal soiling of the peritoneal cavity for inspection or resection, as may be required For the safe approach to and treatment of the sliding hernia,[17] the advantage is obvious This approach is also exceedingly helpful in treatment of femoral hernia,[7] *in that the femoral hernia sac can* be located, inverted and closed with striking ease (A single mattress suture can be inserted from above to narrow the femoral ring)

Trauma to branches of the ilio inguinal nerve is avoided in that it need not be disturbed The spermatic funiculus is not traumatized nor disturbed and testicular atrophy has not been observed, nor has postoperative swelling of the scrotal contents complicated surgery The conjoined tendon is either reinforced or constructed by the use of the aponeurotic suture, while at the same time the transversalis fascia is tightened in the floor of the inguinal canal The final result is an inguinal region which has the anatomic pattern found in the normal abdominal wall

To date, only two of more than two hundred eighty hernias so repaired have come to my attention as recurrences Both of these were in patients who had bilateral inguinal herniorrhaphy Following occasions of extreme stress, these patients developed a bulge in the inguinal region Both patients were reoperated upon to study the cause of apparent failure, and it was found that the original operative areas were intact, but that now there existed a direct hernia bulge at the lateral edge of the rectus sheath Under such conditions, they could not rightly be termed recurrences, but rather hernias at a new site of weakness of the abdominal wall

SUMMARY

It has been estimated that approximately 10 percent of the male population of the United States has or has had an inguinal hernia Surgeons have never entirely agreed upon a method for surgical cure of inguinal hernia because no single technic takes into consideration the extreme variability in the anatomic structure of the inguinal region of the abdominal wall A surgical procedure which is designed to employ an inconstant structure such as the conjoined tendon or the transversalis fascia, as an essential item in its performance will be successful only in proportion to the integrity of that structure It is necessary that the operator be not only a technician but an experienced student of anatomy and physiology in order to recognize the etiologic factors responsible for the production of each herniation

A step by step description is given of a procedure which requires a wide dissection of the inguinal region and an approach to the hernia sac from within the peritoneal cavity After the hernia sac has been disposed of and the peritoneal cavity closed from within by this method, a strip of the aponeurosis of the *external oblique attached at the pubic tubercle* is employed as a living suture to construct or reinforce a conjoined tendon and produce an internal inguinal ring which closely resembles in structure and function that which is usually described in the anatomy text Although this method of herniorrhaphy may be considered a radical surgical treatment, it is actually a *plastic operation for the cure of an anatomic* abnormality

RIASSUNTO

Le statistiche dimostrano che il 10 percento circa, della popolazione maschile degli S U . è stata od è affetta da un'ernia inguinale Nonostante una percentuale così elevata, manca ancora un metodo sul quale i chirurghi siano tutti d 'accordo, in quanto nessun metodo puo' essere applicato a tutte le possibili variazioni anatomiche del canale inguinale I metodi finora adottati ricorrono infatti alla falce in-

guinale od alla fascia trasversale: strutture molto variabili nella loro integrità, donde risultati operativi molto incostanti. Il chirurgo deve essere non solo un tecnico, ma un cultore dell'anatomia e della fisiologia per riconoscere i fattori responsabili di una determinata ernia.

L'A. descrive un metodo operativo che richiede un'ampia dissezione della regione inguinale e che raggiunge il sacco erniario dall'interno della cavità peritoneale. Dopo che il sacco è stato reciso e la cavità peritoneale richiusa dall'interno, una striscia dell'aponeurosi del muscolo obliquo esterno, attaccata al tubercolo pubico, viene utilizzata quale materiale di sutura onde rinforzare la falce inguinale e ricostruire un anello inguinale interno simile—per la sua struttura e per la sua funzione—a quello comunemente descritto nei testi di anatomia.

Questo metodo di erniorrafia costituisce in realtà non tanto un'operazione radicale, quanto un'operazione plastica per la cusa di un'anomalia anatomica.

SUMARIO

Se ha estimado que aproximadamente un 10% de la poblacion masculina de los Estados Unidos sufren o han sufrido de la hernia inguinal. Los cirujanos aun no estan de completo acuerdo sobre el metodo de seleccion en el tratamiento de esta anomalia, por cuanto ninguna de las tecnicas que se han descrito reconocen la variabilidad anatomica de la region inguinal o de la pared abdominal. Un procedimiento quirurjico que depende para su exito el empleo de una estructura inconstante como es el tendon de conjunto, los resultados obtenidos dependeran indudablemente de la integridad de dicha estructura. Es necesario que el cirujano no solomente sea un tecnico adepto, sino tambien un buen estudiante de la anatomia y de la fisiologia de la region inguinal, pues solo asi podra reconocer los factores etiologicos responsables en la produccion de la hernia presente en cada caso.

Se ha descrito en detalle un procedimiento que requiere la diseccion amplia de la region inguinal y la reseccion del saco de hernia por la via intraperitoneal. Despues de la reseccion del saco y la sutura del peritoneo por la via intraperitoneal, se obtiene una banda de la aponeurosis del obliquo menor de insercion en el tuberculo del pubis y se emplea, como sutura viva, para reconstruir y reinforzar el tendon de conjunto y al mismo tiepo producir un nuevo anillo inguinal interno cuya estructura y funcion simile anatomicamente el anillo clasico de los anatomos.

Este procedimiento aunque se considere como un procedimiento radical es en realidad una operacion plastica en la correccion de una anomalia anatomica.

SOMMAIRE

Il est d'opinion générale que ten percent de la population male des Etats-Unis a ou a eu une hernie inguinale. Les chirurgiens n'ont jamais été entièrement d'accord sur la méthode à employer pour la guérison chirurgicale de la'hernie inguinale, parce qu'aucune technique ne prend en considération les differences anatomiques de la région inguinale de la paroi abdominale. Un procédé chirurgical basée sur l'emploi d'un élement anaîomique de structure inconstante tel que le tendon conjoint ou le fascia transversalis comme moyen, obtiendra une guérison en rapport avee l'intégrité de ces structures. Il est nécessaire que le chirurgien soit non seulement un bon technicien, mais soit aussi bien documenté sur l'anatomie et la physiologie de la région. Il doit reconnaitre les facteurs essentiels responsables de la prodiction d'une hernie. L'auteur donne une description détailleé d'un procédé qui demande une dissection étendue de la région inguinale et de l'approche du sac herniaire par la cavité péritonéale. Après la suppression du sac herniaire, un lambeau de l'aponévrose du muscle est râttaché à l'épine pubiynne. On emploie une suture vivante pour construire ou renforcer le tendon conjoint et produire un anneau inguinal interne qui ressemble comme forme et fonctiona celui, décrit ordinairement dans les onvrages d'anatomie. Quoique cette méthodes herniorrhaphie peut être considérée comme le traitement chirurgical radical, c'est en verité une opération plastique pour la guérison d'une anormalité anatomique.

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Open Operative Treatment of Major Fractures and Joint Injuries*

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THE two prevailing opinions concerning the treatment of major joint and bone injuries deal with the primary closed therapeutic method and the open surgical method. In both schools the objectives in the care of fractures and dislocations are rapid maximal functional and anatomic restoration with minimal morbidity and mortality.

Today the preservation of the tone and function of soft tissues, and the mobility of articulations, are of paramount importance. Older methods of prolonged immobilization produced an unsatisfactory end result which was largely attributable to muscle atrophy, ligament and tendon contractures, osteoporosis, degenerative ankylosing arthritis, and other sequelae resulting from long disuse.

Previously, surgery in fractures and dislocations has been used, particularly in large clinical centers.[9, 10, 14, 15 18, 30, 31] The work in this field, executed by such surgeons as Lambotte,[23] Lane,[24] and Sherman,[36] demonstrated the effectiveness of open operation in difficult cases. But catastrophic end results dissuaded most practitioners from undertaking open reduction save in exceptional instances. Since operative reduction implied the risk of converting an uninfected fracture into a case of major sepsis, the disadvantages of open reduction far outweighed its advantages.

In the past decade, however, with a therapeutic aramamentarium augmented by antibiotics, sulfonamides, transfusions, fluid-electrolyte, and protein replacement therapy all surgical horizons have expanded. Evaluations of open versus closed treatment of fractures based on the experience of 10 or more years ago, and omitting the newer adjuvants of operative care, can no longer be considered valid. The purpose of this paper is to survey the results of a relatively large series of operative cases observed from 1942 through 1947. These cases (all on the services of the senior author) were treated at a municipal hospital with average orthopedic operative facilities. The operators were some six members of the visiting staff in traumatic surgery or a succession of residents working under the direct supervision of the visiting staff.

We do not advocate the routine operative treatment of major fractures. However, with a decreased risk of infection now achievable, as demonstrated in this series, what was once the foremost objection to open reduction becomes much less significant and as a consequence elective indications have been amplified. Many authors have reported similar conclusions since 1940.

Notable among the articles advocating operative procedures in the treatment of these injuries are the studies of Burns and Young[4] Headings,[18] Mansfield,[25], Murray,[29] Ronald,[31] Lee,[22] Stinchfield,[40] Collow and Erving,[7] Murphy,[29] and Bick.[6] These papers stress primary operative fixation in simple fractures, although compound fractures also are discussed. The recent monograph of Venable and Stuck[16] on primary internal fixation may become a classic thesis for this form of treatment.

ADVANTAGES VERSUS DISADVANTAGES OF OPEN REDUCTION

The observation of Watson-Jones[48] (concerning the few methods of treatment, one condemning and the other advocating the general operative treatment of fractures) lies in the "job well done" by either method, is an apt aphorism indeed. The efficacy of both closed and open treatment depends on the choice of method and on the care given in the preliminary, definitive, and follow-up stages. Moreover, inadequate immobilization or treatment of shock in the initial period outweighs the most exact reduction, and inadequate re-

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*An analysis of 257 cases treated at a municipal hospital from 1942 through 1947.

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habilitative physiotherapy is as disastrous as an unwise operation in determining the end results

Early ambulation and its physiological benefits are now well established as a major advantage of internal fixation In Lee's[22] series of 42 fractures of long bones treated by open reduction and screw fixation, the average patient was out of bed in a few days and was discharged in two weeks The reported experience of many authors, as well as our own illustrates that patients, particularly those with lower extremity fractures may be safely discharged from the hospital within ten days to three weeks Early ambulation is not synonymous with early weight bearing but it does mean that the patient is not anchored to his bed by a cumbersome traction apparatus or a massive plaster cast, encasing half the body and completely immobilizing him from eight to 12 weeks The optimum period for weight bearing or full use of an extremity varies with the type of fracture and we suggest a *graduated, unhurried program of encouraging* the resumption of limb function

In complicated fractures x rays frequently do not reveal the degree of comminution In many instances the more accurate visualization of the lesion at operation facilitates proper handling Often the so called conservative methods of treating fractures entail a risk tantamount to that of open reduction Balanced traction methods require vigorous supervision which is often unavailable Consequently, distraction of the fractured surface may occur, a circumstance that militates strongly against the eventual production of dependable callus, even when separation is minimal Pin traction methods, double or single, may be followed by infections varying from minimal to severe

Siris[41] has stressed the dangers of pin traction equating them with those of internal fixation as regards the incidence of serious infection The occurrence of osteomyelitis in his series closely parallels that of other writers[11, 1, 36] in cases of open reduction Kirby and Fitts,[20] in evaluating 342 cases during their war experience using transfixion pins and wires showed that pins for skeletal traction are relatively safe and reliable In this later series, *prophylactic oral* sulfonamides were utilized in 60 percent They reported only one serious infection and discounted the usual slight drainage from pin holes This coincides with our experiences with internal fixation,

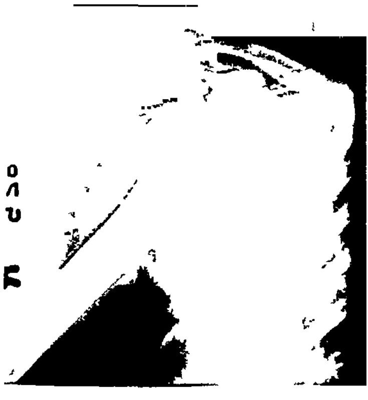


Fig 1A Dislocation of a shoulder with fracture of greater tuberosity Attempted reduction by manipulation under anesthesia and by hanging cast

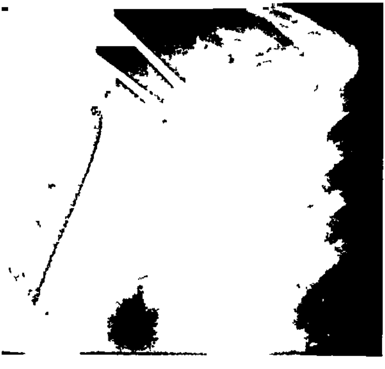


Fig 1B Roentgenogram six months later showing accurate reduction and restoration of normal contour of head of humerus Note absence of exuberant callus

in which patients treated in the era of sulfonamides and antibiotics ran a minimal risk of infection.

Buchmann and Blair[3] in 1947, reporting on the precautionary administration of penicillin in 41 surgical procedures on bones and joints, also have stressed the dependability of penicillin, showing that despite contamination, considerable trauma, or prolonged procedures, only one instance of infection occurred. This substantiates our experiences and those of other authors,[11,19,21,22] and contradicts the older dictum that in open bone surgery infection transcends the dangers of distraction, delayed union, and nonunion. But anti-infective therapy is useless without proper surgical intervention.

Primary disadvantages of internal fixation are the usual operative risks of surgical morbidity and mortality. An unsuccessful operative procedure here (as in general surgery) or a local infection may increase the disability beyond the initial injury. A weak patient not adequately prepared for anesthesia or not prophylactically treated for shock is subject to serious complications. It is our experience that the incidence of such untoward aftereffects is not significantly increased in properly managed cases. A possible cosmetic disadvantage of open reduction is that the incisional scars may be unsightly. Wherever this is important, it merits consideration as a possible contraindication to surgical treatment.

INDICATIONS FOR OPEN REDUCTION

Internal fixation is not the routine treatment of all fractures of the long bones. As successful operative procedures increase, the elective indications for surgical intervention will be enlarged. Today there is a marked variation from hospital to hospital in the extent to which surgeons resort to open reduction. Stinchfield[40] in 1947 estimated that in most hospitals less than three percent of fractures were so treated, and that at the Presbyterian hospital, New York City, open reduction was carried out in ten percent of all cases of fracture. The Fracture Report for 1946 from the Mayo Clinic[27] shows that, in this institution, 304 of 703 patients with fresh fractures were admitted to the hospital. Of the 304 hospitalized, 136 underwent open reductions, an operative management of approximately 45 percent. At the Cumberland hospital, of all patients hospitalized because of major fractures, 16 percent underwent open reductions from 1942 to 1947.

THE INDICATIONS FOR OPEN REDUCTION.

I. *General—Advisable or Obligatory:* 1. Failure or instability of manipulative or distractive reduction, malposition, nonunion, malunion. 2. Probability of delayed union. 3. Associated tendon, nerve, or major vessel injury. 4. Massive soft tissue avulsion and destruction. 5. Major bone defects, soft tissue interposition. 6. Major joint disorganization. 7. Failure of initial operative reduction. 8. Multiple fractures posing unduly difficult mechanical problems in fixation.

II. *Specific—Desirable or Elective:* 1. Femoral shaft, oblique or transverse. 2. Neck of femur. 3. Tibia with fibula, middle and lower thirds. 4. Radius with ulna, with marked displacement. 5. Olecranon, with marked displacement. 6. Patella, with marked displace-

Fig. 2A. Comminuted fracture of upper humeral shaft with adduction displacement of proximal fragment. Reduction unstable after manipulation, traction, and plaster fixation.

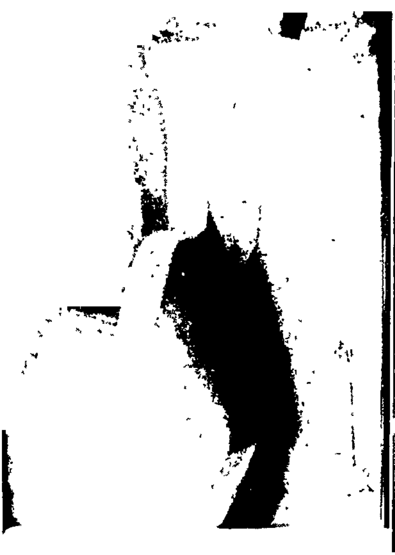


Fig. 2B. Appearance after three weeks of treatment by hanging cast. Displacement marked with no evidence of union

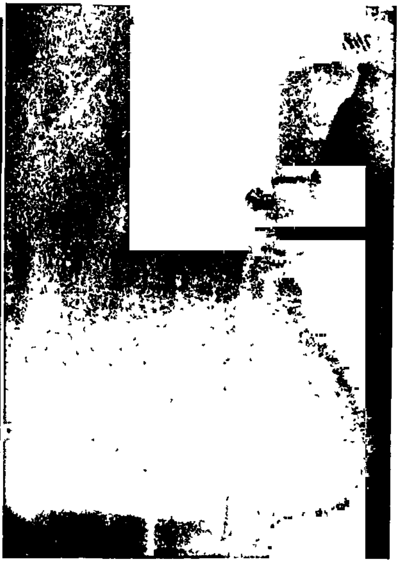


Fig. 2C. Bone graft and internal fixation after two weeks. Result after four months of operation.

ment. 7. Humerus, oblique or transverse, with marked displacement. 8. Head of radius.

Special indications for operative reduction may be presented by certain fractures that might also respond to the closed reduction method. Elective operation is suggested when early ambulation and discharge from the hospital is important to the patient, or when fractures of long bones, treated by manipulative procedures, require markedly uncomfortable retentive apparatuses in debilitated or obese patients. Occasionally patients have preferred operative treatment based on their experiences or on observations of other patients.

SITE INCIDENCE AND METHODS USED IN THE PRESENT SERIES

This report covers 257 major bone and joint injuries and is a consecutive unselected series of patients operated on from 1942 through 1947. Table 1 summarizes the case distribution.

A variety of operative methods were utilized. Predominantly bone plating or screw transfixion were performed except in reductions of the fractured hip where hip nailing was done. The utilized procedures are the following:

Methods Used (alone or combined): 1. screw transfixion or bolt—25 cases; 2. nail transfixion—Moore, Steinmann—6 cases, Smith, Peterson—36 cases, Jewett, Knowl's etc.—12 cases; 3. internal wire fixation—heavy gauge or Kirshner—15 cases; 4. bone plating—47 cases; 5. parham bands—29 cases; 6. bone graft, tibial, ilial—12 cases; 7. intramedullary pegs—bone, metal—4 cases; 8. reduction, suture, external fixation and impaction (this group primarily in early years of series—32 cases; 9. kangaroo or grafted tendon suture—5 cases.

Table 1. *Site Distribution of 257 Major Bone & Joint Injuries**

Fractures:			Totals
Humerus	Upper	8	
	Middle	7	
	Lower	12	27
Radius and ulna	Middle	10	
	Lower	6	
Olecranon		10	
Ulna, shaft		2	
Radius		10	
Monteggia		2	40
Femur, Neck		58	
Shaft		26	84
Patella			8
Tibia and Fibula	Upper	5	
	Middle	15	
	Lower	13	
Tibia		42	
Fibula		1	76
		Total	235

Joint Injuries (Without Fracture)	
Shoulder (dislocation)	5
Elbow (disolocation)	2
Wrist (dislocation)	2
Knee (Derangement of menisci)	8
(Osteochondritis desiccans)	5
Total	22

**Excluding fractures of hip and olecranon, joint involvement was present in 33 patients, compounding in 53, and comminution in 61.*

SURGICAL FUNDAMENTALS IN OPEN REDUCTIONS

Emergency and Preparatory: Pending operation fractures are mobilized or a corrective distraction apparatus is applied. Hemorrhage and shock are combated and anti-infective premedication is given. Infection prophylaxis may require the administration of serums, chemotherapy, or antibiotics. Specific preparations are directed against tetanus, gas gangrene, pyogenic organisms and the coliproteus bacteria. Systemic preoperative preparation may require restoration of fluid-electrolyte balance or replenishment of vitamin and protein reserves,[13] particularly in debilitated malnourished elderly persons. Local preoperative preparation must be done thoroughly, but we no longer prescribe the 48-hour extremity preparation used several years ago.

Definitive: The operation is performed under rigid aseptic technic. Meticulous debridement of all devitalized tissue is mandatory. Infected bone and foreign bodies require excision. A skin incision sufficiently adequate for good exposure is made, as a rule directly over the fractured area. Thorough familiarity with the anatomic location of important nerves and blood vessels is essential to safeguard these important structures. Muscles are sharply incised and separated with a minimum of trauma. Usually the periosteum is split and stripped, and bone reconstruction is carried out subperiosteally wherever possible, with maximum preservation of periosteum and soft tissue attachments. Careful exploration of the injury by direct inspection must be emphasized. The fracture is reduced as accurately as possible, and the fragments are held in position, as a rule, by means of suitable bone clamps until fixated. Copious saline irrigation is mandatory for compound lesions.

Mechanical problems are considered from the viewpoint of corrective orthopedic engineering, and the optimum means of adequate internal fixation (supplemented by external fixation where necessary) is decided upon. Plates and grafts must be of sufficient length to ensure rigid immobilization of the fracture fragments.[6, 22, 37, 36, 38, 16, 18] When simple screw transfixion is utilized, the direction of the screws in general should be at right angles to the fracture line rather than merely obliquely placed or inserted at right angles to the bone shaft. Screws must be long enough to penetrate both medial and lateral or anterior and posterior cortices.

The types of electrolytically inert rigid metal alloys best suited for internal fixation and the routine technical details are beyond the scope of this paper, but are considered in current literature.[33, 12, 16, 18] In comminuted fractures all fragments are preserved,

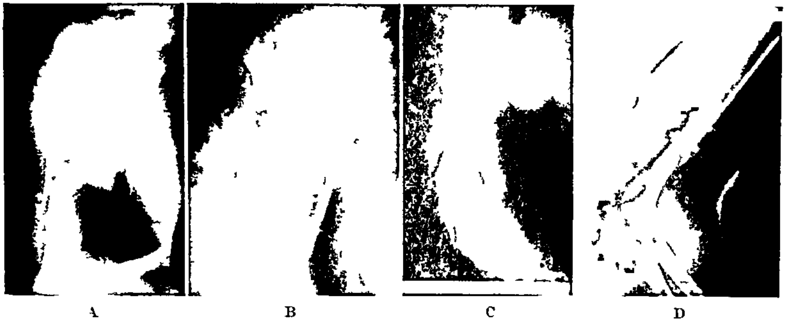


Fig. 3. *A, B, C, and D. Examples of comminuted fractures of humerus treated by internal fixation with* Parham bands. Note the relative absence of external callus and translucent fracture lines five weeks after operation in both cases. This is a usual finding in internal fixation as described by Bick. Anatomical and functional end results in both cases were good.

for any loss of continuity of bone substance creates dead space or greatly weakens a healing fracture line. The test for adequate fixation is rigid immobilization. For injuries in which joints have been compounded, a complete and careful capsular closure is done. In closure, all layers are carefully sutured with a minimum of tension, and catgut, plain or chromic, is most frequently utilized for all buried sutures.

Although some authors[39] advocate the frequent open dressing of compounded fractures, we usually close such injuries snugly. Bone and muscle are never left bare and, where needed, temporary split thickness or permanent full thickness pedicled or free skin grafts are utilized for coverage. In a few instances of extensive tissue loss by avulsion or massive contamination, we have resorted to occlusive packing of denuded soft tissues as a temporary measure.

Anatomic precision and careful operation are required for success and careful anesthesia, adequate operative facilities and trained assistants are indispensable. In our early cases the various sulfa drug crystals were dusted into the wound. More recently we have used penicillin solutions diluted for irrigation and concentrated for injection, before closure. Our primary dependence is upon the systemic administration of sulfonamides and antibiotics (in relatively large doses), for one to three weeks. Our postoperative retentive dressings vary. We agree with those authors that adequately transfixed fractures should require minimal external support and often none. At most a thinly padded light circular cast may be applied or a Thomas splint.[11,36,40,46] Although their significance must not be underestimated, further details of postoperative supportive care and physiotherapeutic regimes are omitted for reasons of brevity. As a rule relatively early weight bearing is encouraged, but our program in this regard represents a compromise between past conservatism and the radically early ambulation now practiced in some clinics.

ANALYSIS OF COMPLICATIONS AND FAILURES

Statistical comparisons of end results of the open reduction of fractures are somewhat difficult to assess, for individual case series are not strictly comparable. Moreover, the majority of articles published prior to 1945 dealt with a relatively small number of cases stressing open reductions for complicated compound or delayed union fractures. Since a fairly large series of simple fresh fractures has rarely been presented, we will try to analyze and evaluate our own end results. A general concept of the recent incidence of failures and complications in open reductions

Table 2. *Deaths: Tabular Analysis*

	Total cases	All deaths	Gross mortality rate, %	Corrected operative mortality, %
Fracture Site				
Upper extremities	76	0	0	0
Lower extremities	181	19 (total)	9	6.6
Femur, neck	58	11	19.1	11
Femur, shaft	26	4	15.4	11.5
Tibia, fibula	76	4	5.3	0
Other sites				
All cases, excluding hip fractures	199	9	4	3
Lower extremity, excluding hip fractures	123	8	6.5	4.9

Outside of 11 fatalities in cases of fracture of the femoral neck (a lesion universally attended by a high rate) it should be noted that there were deaths in only two cases, in only one of which bone infection had occurred. Here the bone infection, although of a serious degree, was controlled and, although contributory, was not the primary cause of death. The individual data on postoperative deaths serve to explain the derivation of our gross and corrected operative mortality percentages (Table 3).

Table 3. *Data on 19 Postoperative Deaths*

Fracture site	Total cases	Range of age	Nonsurgical deaths	Operative deaths	Wound infections
1. Femur, neck	11	54–82	(i.e., after 10 day period; cardiac; apoplexy; etc.) 8	Shock 1 Pneumonia 1 Pulmonary infarct 1 } 3	1—B. Pyocyaneus
2. Femur, shaft	4 (2 compound)	47–76	2	Gas gangrene 1 Pneumonia 1 } 2	1—Gas gangrene
3. Tibia, fibula	4 (All compound)	43–68	1	Shock 2 Fat embolization 1	1—Osteomyelitis

and fixations at other clinics may be derived from the somewhat limited figures currently published.

The Mayo Clinic Fracture Report for 1946 stated that there were four deaths in 136 open reductions for fresh fractures: two were in cases of fractured femoral necks, one in a vertebral fracture, and one in a pelvic fracture. Although most papers dealing with operative treatment in fresh fractures are descriptive and omit extended numerical consideration of their outcomes, many recent papers analyzing end results in compound fractures treated by internal fixation have appeared. The overall impression gained from recent results in compounded fractures in which contamination is anticipated tends to confirm our belief that with present day methods there is relatively small risk of introducing serious infection in fresh simple fractures by careful open operation. In the monograph on internal fixation by Venable and Stuck, little information concerning the incidence of failure appears, and mortality and morbidity figures are not given.[46] Keon Cohen reported that in 187 closed cases treated by open operation, five instances of sepsis appeared.[71] All infection cleared after removal of metal and was not considered to have seriously affected the healing of the fractures. Lee stated that in 42 patients treated by open reduction no serious infection was observed, although a number of the fractures were compounded.[7]

In our own series of 185 major simple fractures treated by operation there were five instances of significant or serious infection with one death. In analyzing our known "complete failure group" we find it most convenient to classify them under the headings of (1) deaths, (2) failures due to infection, and (3) mechanical failures.

The advantages of open reduction over closed treatment cannot be deduced simply and readily from the fact that the former method, at our institution was accompanied by a lower gross mortality and morbidity. Generally, the gravely injured the feeble elderly, and the seriously ill are treated conservatively, as befits the group of poorest surgical risks. Consequently the greatest death rate occurs among persons not subject to operation.

Failures Due to Infection. These are known cases of major suppurative infection following operation within eight weeks usually with no appreciable healing of the primary bone or joint injury during the normally expected period. Twenty two cases are excluded, since the patients were discharged from the hospital without a clinical follow up or a readmission in less than the minimum two month observation period when serious acute infection might be expected to occur. The anticipated and frequently encountered slight drainage, which disappears spontaneously in two to eight weeks, or the irritative low grade osteitis which clears up when metallic devices are removed after bony union is satisfactory, are not considered here as major complications. It is only in instances of this nature that hardware used for internal fixation is removed routinely by our service. Delayed aseptic necroses of the femoral head observed in some 20 percent of hip fractures, are excluded for they are not restricted to fractures undergoing operative fixation.[1, 43, 48] A summation of our infection failures is given in Table 4 followed by an outline of the pertinent data on individual cases.

Table 4 *Failures Due to Infection in 235 Cases*

Cases		Major infections	Percent	Died	End Result—Cases		
					Poor	Fair	Good
Total	235	10	4.2	3	2	2	3
Compound	50	5	10	2	2		1
Simple	185	5	3	1	1	1	2

In 185 cases of non compounded fractures, open reduction was followed by major suppurative infection in three percent with one death. Only in two cases did poor or fatal results appear which were directly due to surgical intervention. This compared quite favorably with operative morbidity and mortality rates in other types of surgery. Although sulfonamides were used in most cases (penicillin since 1945) the full prophylactic and therapeutic effect of the larger doses of antibiotics available during the past three years cannot be evaluated in this series.

Table 5. *Data on Major Infections*

Case No.	Injury site	Compounded	Complicating infection	Outcome
1	Radius, ulna	No	Osteomyelitis	Good results after secondary operation
2	Radius, ulna	No	Wound infection, osteomeylitis	Fair results after secondary operation
3	Shoulder joint	No	Supperative arthritis	Poor, partial ankylosis
4	Femur, neck	No	B. pyocyaneus wound infection	Sepsis, death
5	Femur, shaft	No	Osteomyelitis	Good functional results after secondary operation
6	Femur, shaft	Yes	Gas gangrene	Death
7	Tibia, fibula	Yes	Osteomyelitis	Delayed union, ultimately fair result; nonunion; osteosclerosis; still failure after two bone grafts
8	Tibia, fibula	Yes	Osteomyelitis	Fair results after secondary operation
9	Tibia, fibula	Yes	Soft tissue infection	Delayed union; patient died during sequestrectomy 1½ years later
10	Tibia, fibula	Yes	Osteomyelitis	Good results after secondary operation

Mechanical Failures

Case No.	Site	Results
1	Tibia, fibula	Complete nonunion
2	Radius	Marked angulation
3	Humerus (supracondylar)	Marked displacement
4	Humerus	Poor alignment
5	Shoulder	Partial ankylosis
6	Tibia	Plate broken, successfully replaced

Comment: With the exception of cases one, two, and five, these patients refused corrective secondary procedures. In the interim they may have had surgical revision elsewhere.

Mechanical failures in any large series appear to be inevitable, but fortunately occur relatively seldom.

INTERNAL FIXATION IN COMPOUND FRACTURES

The relative merits of open versus closed treatment of compound fractures are still unsettled. More and more writers have reported and defended more cases of compound fracture treatment by prompt debridement, open reduction and immediate closure. Their published recommendations still reflect a considerable variance of opinion. Smyth and Ravieri[39] advocated internal fixation but without primary closure, preferring the Orr method for four weeks (a sterile petrolatum gauze pack and closed circular encasement). In penetrating joint injuries they, as well as Thomson and Berry[41] recommended a thorough exploratory arthrotomy and removal of all devitalized tissue and debris, followed by a final water-tight closure of the joint capsules.

Many recent reports on the treatment of fractures, emanating from military medical sources, attempt to analyze standardized procedures used in a large number of cases However, these methods must be compared with methods used in civilian practice

In metropolitan hospital experience adequate surgical facilities are more easily available, thus accommodating patients for any required period of follow up observation by the original operating teams Also, civilian patients generally are operated on only after treatment for shock and hemorrhage Gunshot wounds are rarely a cause of compound fractures in civilian life In contrast with both rural and battlefield practice, soil contamination is less, and the risk of tetanus or gas infection almost negligible

Judged from the more truly comparable case series reported by civilian surgeons from cities of moderate or large populations the proper early internal fixation of compounded fractures in selected cases is attended by little risk and results, as a rule, in earlier ambulation and restoration of function Hampton has emphasized the contrast between compound wartime and civilian fractures[11] He stated that in 41 percent of 168 cases in which briefly delayed internal fixation of compound battle fractures was performed, sequestration resulted Often the infections were grave, sequestrations massive, and grafting required Collow and Erving reported that in 23 of 24 cases of internal fixation of compounded fractures of the femoral shaft, good results were obtained with primary closure Burnes and Young[4] in a series of 70 nonmilitary cases of compound fractured femur reported similar results Those authors utilized penicillin in controlling invasive infection

Davis[11] in discussing 150 cases of compound fractures, of which some 80 were major fractures involving the long bones, likewise concludes that internal fixation and primary closure constitute the optimum treatment He indicated that this has become true particularly since 1942, with the advent of sulfonamides, antibiotics, blood banks, high protein vitamin dietary supplements and routinized skin and bone grafts as well as the development of inert non irritating metallic fixation devices In his series 87 percent of the patients were healed by first intention In 13 cases (8 5 percent) there was superficial infection In one plated tibia he encountered a complete failure, with osteomyelitis followed by plate removal and bone grafting, with persistent nonunion Four deaths resulted from 80 cases of major fractures and apparently six instances of serious infection One fatality was in a case of gas gangrene, the patient having been injured while in country surroundings

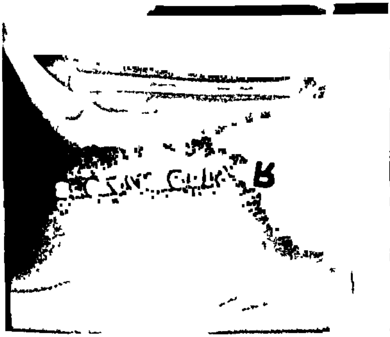


Fig 4A Five month old unreduced Monteggia fracture with malunion

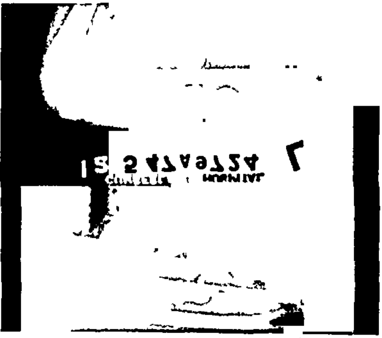


Fig 4B Result six months after secondary operative reduction and fixation Radiohumeral dislocation corrected, function of elbow unimpaired

Fig. 5A. Comminuted compression T fracture of both condyles of tibia and head of fibula, involving articulation.

Fig. 5B. Results eight months after operation using bar bolt and sliver graft to restore joint contour. Knee function satisfactory, no limp.

Stimson,[36] in reviewing 65 cases, also found that compound fractures of femur and tibia shafts, suitably selected and properly plated, are best treated by internal fixation. In this group there were seven deaths, one amputation, two instances of nonunion, and 11 instances of sequestrectomy. However, these complications and fatalities occurred prior to 1932. Stimson stated that areas of erosion of bone around improperly applied screws may serve as a potential source of infection. This is prevented by securing sufficient rigidity via internal fixation to obviate torsion strain and means that an adequate plate length, supplemented by one or more transfixion screws, is needed. Keon-Cohen[21] included in his report 47 cases of compound fracture treated by internal fixation. Of these, 34 were healed by first intention and eight after minor degrees of superficial skin sloughing. In five patients significant and serious sepsis developed.

Joldersma[19] expressed another opinion in reporting on a series of 32 simple tibial and femoral fractures by bone plating. He did not plate compounded fractures. Lee[22] also described no instances of sepsis in 18 compounded fractures subjected to immediate debridement, internal fixation, and primary closure.

In our series we have excluded both compound and simple fractures of small bones of the hands and feet, since the majority of the patients were ambulatory and hospitalized for short periods only, and since a large number did not return to the clinic for follow-up care and observation.

A group of 14 compounded fractures about the head were treated on our service during the same period. In no instance did serious bony infection occur in these cases, although three patients were treated prior to our utilization of penicillin. Five of these had a relatively

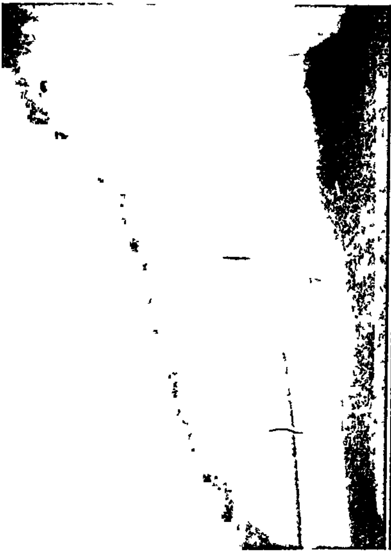


Fig 6A Fracture of femoral shaft with distractive nonunion

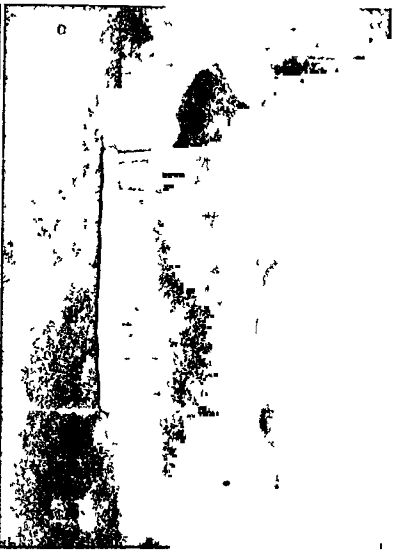


Fig 6B Five months after operation, gait and weight bearing unimpaired

serious head injuries and concussion phenomena, four had noncompounded basilar skull fractures of the vault two had compounded fractures of the mandible and seven had compounded comminuted fractures of the nasal bones in two of which the accessory nasal sinusus were involved Cases of compounded skull fracture requiring anything other than simple bone elevation or extensive neurosurgical procedures are not included since such injuries are transferred to other services for definitive treatment

Table six shows our experience with compound fractures treated by open reduction The majority of the failures (deaths and infections) occurred in early years of the series and in the most seriously injured patients The great variation in extent of injury in persons sustaining compound fractures militates against any strict comparisons from series to series The violence of the injuring forces and the nature of concomitant organic injury or the multiplicity of wounds i e the varying severity of trauma sustained in individual cases rather than the therapeutic program—may in large measure determine the end results

FRACTURES OF THE UPPER EXTREMITIES

Fractures of the Humerus The popularization since 1933 of Caldwell s hanging cast has reduced considerably the indications for open reduction and internal fixation in humeral fractures In certain types of fractures of the upper end of the humerus the traction of the hanging cast may fail to facilitate the return of the displaced fragments to normal position In such instances, open reduction and internal fixation are advantageous Avulsion fractures of the greater tuberosity of the humerus, if poorly reduced, will be followed by impairment of the [illegible] action of the supra-

Table 6. *The Compound Fracture*
An analysis of experience with 53 cases treated by debridement and open reduction.

Site	No. Cases	International fixation	Complications
Humerus	2	2	None
Radius, ulna	11	6	2 moderate infections (healed without further surgical treatment)
Femur, shaft	8 (2 bilateral)	8	1 operative death (gas gangrene)
Tibia, fibula	31 (2 bilateral)	24	3 operative deaths 4 major infections 1 healed without surgery 2 required sequestrectomy 1 *nonunion with osteosclerosis, re*peated operation unsuccessful

spinatus muscle of the shoulder. In fractures of the surgical neck of the humerus (when accompanied by dislocation of the shoulder joint) it is sometimes necessary to explore, reduce the dislocation, and immobilize the fragments by screw transfixion. Fractures of the midshaft of the humerus require internal *fixation only infrequently.*

Operative treatment is indicated for the compound fracture and may be warranted in cases of extensive comminution. Muscle interposition between bone ends or injury to radial nerve is a mandatory indication for surgical intervention. Supracondylar fractures of the humerus, *most frequent* in children, fortunately are usually reducible by direct manipulation. When malposition cannot be corrected, accurate bone realignment and internal fixation are indicated. Fractures of the internal or external humeral condyles, when grossly displaced, may require the precise anatomic reduction obtainable via open reduction methods in order to prevent damage and functional impairment of the elbow joint or injury to the radial or ulnar nerves.

Fractures of the Forearm: Not infrequently *fractures of the olecranon require operative* treatment. Oblique fractures of both radius and ulna are often difficult to control by conservative measures. If the fragments cannot be impacted in satisfactory position, internal fixation is indicated. The Monteggia fracture (a spiral fracture of the upper third of the ulnar shaft accompanied by dislocation of the head of the radius) can seldom be managed by closed manipulation, consequently operative reduction has become the accepted initial *treatment in this type of fracture. In fractures* of the radial head with displacement, myositis ossificans in the past has been a frequent complication when treatment was conservative. Excision of the radial head has been regarded recently as a satisfactory method of management.

FRACTURES OF THE LOWER EXTREMITIES

Fractures of the Hip: When the condition of the patient warrants it, hip nailing is now the usual form of treatment at our institution. The Smith-Peterson nail is most frequently utilized for femoral neck fractures; a Jewett or a similar nailing device is preferred in intertrochanteric fractures. Generally the fracture is reduced preoperatively by suitably directed traction and manipulation reduction being maintained by the manual traction of an *assistant during the actual operation.* A six-inch incision generally suffices for exploration and reduction and, in our hands, surpasses the so-called blind or percutaneous methods of

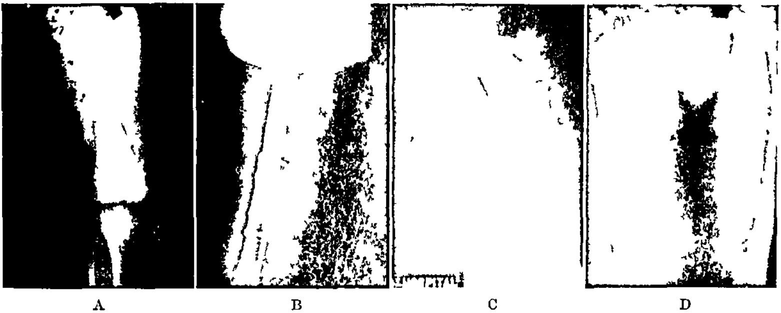


Fig 7A, B, C and D Examples of transverse fractures of femurs in children, unstable after traction and manipulation reduction Satisfactory reduction and end results with internal fixation

hip nailing Nail position is controlled by anteroposterior and lateral roentgenograms Patients are propped up in bed and encouraged to use an overhead trapeze, but as a rule are kept in bed for three weeks Since these fractures almost invariably occur in elderly patients, blood transfusions are introduced to prevent shock

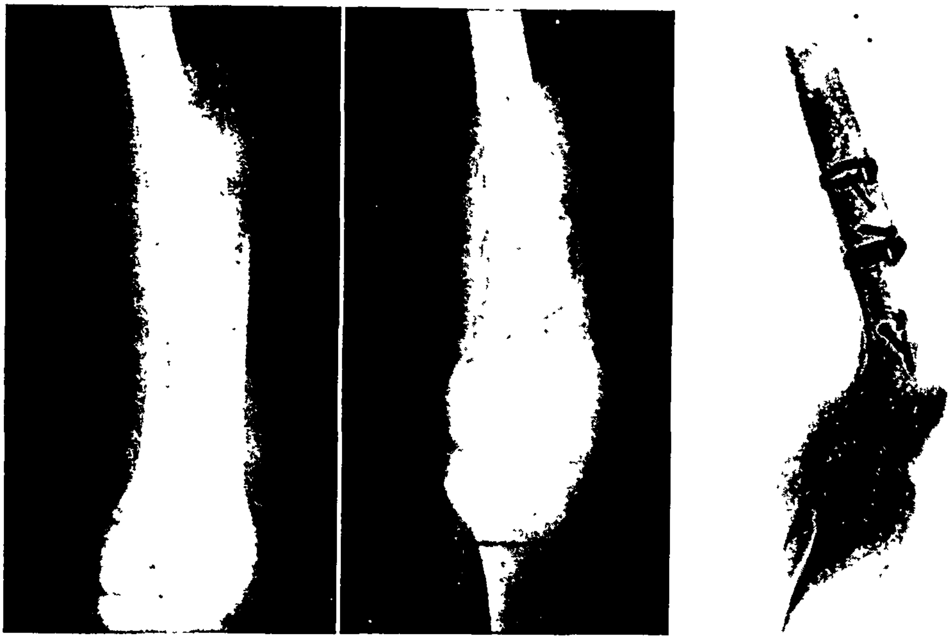
Fractures of the Femoral Shaft Because of the powerful displacing muscle forces, where there are insufficient retaining serrations of the fragment ends, angulation and shortening may ensue The average hospital internment for patients with femoral shaft fractures treated by traction methods is from nine to 11 weeks Occasionally, when early ambulation is warranted, elective open reduction is employed When the fracture is transverse and therefore reduction is unstable or where soft tissue is interposed (or in compound injuries) primary open reduction and internal fixation are indicated In our usual technic a Lane plate is used

The Kunschner intramedullary nail in apparatus successfully used by other workers,[28, 40] has not been used in this series although in certain instances various other forms of intramedullary bone or metal pegging have been employed The Kunschner nail offers no notable advantages over plating, screw transfixation, or Parham bands for internal fixation of long bones The obvious operative difficulty of removing a large intramedullary metallic rod should infection or any other untoward complication ensue, is a notable disadvantage unless provided against

Fractures of the Knee, Leg, and Ankle Condylar fractures of the femur that cannot be properly replaced by traction and manipulation often require internal fixation to restore the normal joint line Usually the insertion of two or more screws of sufficient length at oblique angles to each other suffices Fractures of the patella, when there is wide separation of the fragments, are satisfactorily treated by open reduction and internal fixation generally by wiring, which attempts to ensure satisfactory function of the quadriceps muscle

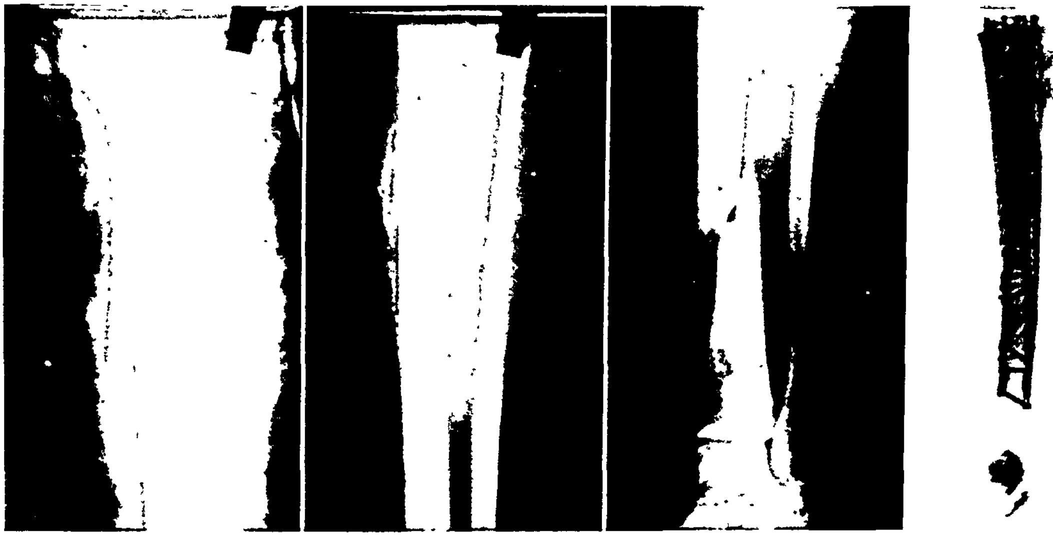
Fractures of the Tibial Plateau Current literature indicates that the well known delayed union and far too common nonunion of the lower third of the tibia, may be prevented by early internal fixation[21, 22, 2, 34, 4, 48] Our experience corroborates this finding Comparative reports of fractures treated by internal fixation and by traction concerning oblique and comminuted fractures of the lower leg outnumber studies regarding other such injuries The majority of recent reports agree that operative reduction with direct fixation is the preferred treatment, for it offers simpler management and better results over a shorter period

In fractures of the tibial plateau, with any marked degree of depression of the condylar fragment, great care must be taken with regard to anatomic realignment, lest the



Figs. 8A, B, C. Compound comminuted supracondylar fracture of femur. Postreduction plates one year later. Note restoration of anatomical alignment and absence of excess callus.

joint become unstable. If the semilunar cartilages are damaged, they are excised. Since the bone is cancellous at this level, large screws must be used. In our hands the transverse Barr bolt, passing through both condyles and providing some degree of compression force has on occasion, proven invaluable. Previously, we have presented a conservative method of managing trimalleolar fractures by means of a distraction apparatus and transfixion pins, embedded in plaster for immobilization once reduction is attained. Fractures of this type,



Figs. 9A, B. Examples of fractures of tibia treated by internal fixation. In the first case, iliac graft and plate were used. Ultimate results were satisfactory in both cases.

in which malposition cannot be corrected by conservative measures, may respond to open reduction Primarily this may be needed where there are separation of the inferior tibiofibular ligament and marked disorganization of the ankle mortise with irreducible displacement of the medial and lateral malleoli In ununited fractures of the internal malleolus, instability of the ankle inevitably follows and is an indication for operative reduction and internal fixation In the majority of fractures about the ankle requiring operative treatment screw transfixtion is the method of choice

TREATMENT OF MALUNION, NONUNION AND INFECTED FRACTURES

Cases of fracture and joint injury in which primary treatment has failed can be defined as those in which malunion, nonunion or osteomyelitis has supervened We include cases that have come to this end after both open and closed methods of initial therapy An exhaustive treatment of management in such disasters is not our purpose but we propose to summarize a number of personal impressions in the past five years which agree with numerous authors,[1, 7, 1, [illegible] 3, 4, 43] and constitute a rather definite revision of earlier opinions

For corrective secondary procedures the patients must be good operative risks no less than for primary internal fixations Poor results in open reduction may be due to infection and contamination or impared healing potentialities in debilitated patients just as well as to poor anatomic alignment and inadequate fixation Restorative procedures to correct hypoproteinemia and anemia (such as may be attendant upon chronic draining sinuses or found in elderly debilitated persons long bed ridden by unhealed fractures) are common basic prerequisites

In both acute and chronic postoperative infections involving bones, McCorkle[28] Buchman and Blair,[4] Farrow[[illegible]] Harley[1] and his associates, and Reynolds and Zaepfel[35] have established the fact that chemotherapeutic and antibiotic agents have made possible a direct operative osteosynthesis by means of bone grafts or metallic fixation devices where such procedures would have led to inevitable disaster and overwhelming infection only a decade ago This does not obviate the necessity as indicated for debridement, sequestrectomy, saucerization and the obliteration of dead space Penicillin alone cannot succeed in bringing about healing if necrotic tissue remains in the wound However systemic antibiotic therapy is effective in controlling infection after adequate operative treatment has removed all necrotic tissue and noxious foreign material

A number of workers[3, [illegible] 3, 4] have had the opportunity to survey and report upon many instances of such secondary operations in the presence of chronic osteomyelitis in which with penicillin administered in large doses over a prolonged period, healing has been *per primum* In approximately three quarters of the cases reported (the various series published now total several hundred) good final results have been achieved, and the value of this *method is well established*

Our concept of what constitutes union agrees with that of Bick and Venable[48] who emphasize that the usual X ray criterion of acceptable bone healing (exuberant external callus formation) need not apply to fractures following internal fixation Bick postulates that a translucent internal callus explaining the visualization of the fracture lines long after the patient is funtionally healed is to be welcomed In his opinion the appearance of massive external callus is an indication that the artificial support of the plates and screws is inadequate We have observed a number of cases which substantiate this viewpoint and we have illustrated several of them in the accompanying figures and legends Impressed with the absolute indispensability of rigid fixation, we adhere to the dictum that "the minimum of hardware be utilized in a given case" only so far as it is consistent with the securing of rigid immobilization of fracture fragments

In the utilization of bone grafts we have recently employed segments of the iliac crest in a number of instances and found them to be as effective as tibial donations Iliac grafts are advantageous in that cancellous bone is provided which has the property of earlier reparative osteogenic proliferation than has cortical tibial bone It also shows earlier amalgamation and fusion with adjacent recipient osseous structures

In [illegible] to [illegible] ing bone ends in instances of nonunion, opening of the medullary canal and multiple drilling appear helpful. When an initial plating has failed we have replated in several cases (at times as a supplement to bone grafting) and have achieved a successful outcome. In malunion of the long bones productive of shortening deformity, or sufficient angulation to interfere with proper muscle and joint action, corrective osteotomy should be resorted to promptly. In onlay bone grafts sometimes we have performed only periosteal stripping, as advocated by Phemister,[32] and depended upon fixation of the graft by soft tissue suture. More often, in agreement with Bishop[5] and his coworkers, we prefer to remove an intermediate thickness of cortex in preparation of the graft bed and in addition use bone plates and screws when necessary to secure rigid fixation of fragments and grafts

In fractures of the femoral neck, from which poor end results may be expected in almost one-third of the cases, largely owing to aseptic necrosis and absorption of the head of the bone, we have depended upon some modification of the McMurray osteotomy of palliative correction in unsatisfactory healing, and have, in a number of cases, been gratified by the improvement attained.

SUMMARY

Open operative treatment of 257 consecutive, unselected major fractures and joint injuries, treated at a municipal hospital from 1942 through 1947, are reviewed and analyzed. In this series 185 major simple fractures were surgically treated including five instances of serious bone infection, with one death. This compares favorably with operative morbidity and mortality rates in other types of surgery.

The routine operative treatment for fractures is not advocated. However, with a decreased risk of infection now achievable, a finding corroborated by the recent literature, elective indications have been amplified. Cocepts of open versus closed treatment of fractures are revaluated in the light of such recent adjuvants in operative care as improved anesthesia, antibiotics, chemotherapy, transfusions, and protein replacement therapy.

Certain advantages of operative fixation over the older traction or closed reduction-immobilization methods of treatment are outlined. The early resumption of motion to preserve the tone and function of soft tissues and the mobility of articulations is considered as an increasingly important desideratum.

The indications for open reduction, the requisite surgical fundamentals, and an analysis of complications and failures are presented. The use of internal fixation in compound fractures is discussed and end results in non military cases contrasted with those following battle injuries. Statistical comparisons are given to substantiate our conclusion that in civilian metropolitan life the proper early internal fixation of simple or compound major fractures, in selected cases, is attended by relatively little risk and achieves as a rule earlier ambulation and restoration of function.

RIASSUNTO

Passa in rassegna ed analizza 257 casi di estese fratture e di lesioni articolari occorsi consecutivamente dal 1942 al 1947 in un ospedale comunale. 185 fratture semplici sono state curate chirurgicamente: in 5 casi si è stabilita una grave infezione ossea, con un caso di morte. Questa percentuale è modesta, se confrontata con la morbilità e la mortalità di altri tipi di interventi.

L'A. non ritiene tuttavia che tutte le fratture debbano essere sottoposte ad un'operazione. Traendo vantaggio dagli attuali mezzi chemioterapici e dagli antibiotici, dai perfezionamenti conseguiti nell'anestesia; dall'impiego sempre più frequente delle transfusioni e dalla terapia sostitutiva delle proteine, l'A. si limita a propugnare una piu' larga adozione di questo tipo di cura.

Pone in evidenza taluni vantaggi delle fissazioni operative sopra i vecchi metodi di riduzione e di trazione: sottolinea particolarmente i vantaggi di una più rapida ripresa dei movimenti, onde preservare il tono e la funzione dei tessuti molli e la mobilità delle articolazioni.

Discute le indicazioni per una riduzione operativa e le basi tecniche dei singoli interventi: analizza le possibili complicazioni e le cause degli insuccessi. Confronta in ultimo le statistche operative militari e civili. Da questo confronto risulta che la fissazione operativa delle fratture semplici o comminute, eseguita precocemente in casi selezionati, espone a

pochi periocoli mentre conduce ad una piu rapida ripresa della deambulaziones e ad un completo ripristino funzionale degli arti colpiti

SUMARIO

Hemos presentado un analisis de nuestras experiencias en el tratamiento por la intervencion cruenta de 257 casos consecutivos y no seleccionados de fracturas mayores de los huesos y de traumatismos articulares que se presentaron en un hospital municipal en los anos de 1942 a 1947 De 185 casos de fracturas mayores simples que fueron tratados operatoriamente (intervencion cruenta) solo cinco casas sufrieron de infeccion osea grave y solo uno termino fatalmente Este resultado se puede comparar favorablemente con los indices de morbilidad y de nortalidad que encontramos en los analysis de las estadisticas de otros tipos de intervencion quirurjica

Aunque no se aconseja e como metodo de rutina la intervencion cruenta en el tratamiento de las fracturas, hemos amplificado sus indicaciones electivas Debido a los adjuvantes modernos en manos del cirujano como los antibioticos, la quemoterapia, la anestesia moderna y las transfuciones proteinicas y de sangre, ha sido posible hacer una reevaluacion de nuestros conceptos sobre la intervencion cruenta (operatoria) en relacion con los metodos de reduccion no cruentos (cerrados) Se han descrito ciertas de las ventajas de la fijacion operatoria sobre los metodos mas antiguos de reduccion e inmobilizacion La ambulacion temprana del paciente con mocion de la parte fracturada mantiene el tono normal y la funcion de los tejidos y de las articulaciones Estos desideratis adquieren mayor importancia en la seleccion del metodo de tratamiento

Las indicaciones de la intervencion cruenta han sido presentados en relacion con los requisitos fundamentales de este tratamiento asi como tambien se ha presentado un analysis de sus complicaciones y de los fracasos incidentes a este tratamiento

El uso de la inmobilizacion interna en las fracturas abiertas ha sido discutido y se han comparado los resultados obtenidos entre los casos civiles y militares Los autores concluyen que en los casos civiles el tratamiento por fijacion interna de las fracturas simples y compuestas en casos seleccionados favorece la rapida ambulacion y restauracion de las funciones normales del paciente

SOMMAIRE

Le traitement operatoire ouvert de 257 cas consecutifs de fractures graves et de lésions articulaires traites a l'hospital municipal entre 1942 et 1947 est passee en revue et analysee Dans cette serie 185 fractures simples majeures furent traitees operatoirement et aussi five cas d infection osseuse Il y eut I deces Les resultats se comparent favorablement avec le taux de morbidite et de mortalité d'autres cas chirurgicaux

Le traitement operatoire routinier des fractures n'est pas preconise De nos jours les dangers d'infection etant diminues, les indications particulieres ont ete augmentees L'auteur compare le traitement ouvert et fermé Le traitement ouvert des fractures doit être reconsidere, vu les progres de l'anesthesie des'antibiotiques, de la chîmotherapie, des transfusions et de la therapenfique bit les proteine

Certains avantages deffixations operatoires sur la vieille traction et sur le traitement par reduction et immobilisation sont decrits La pratique de la mobilisation pour preserver le tonueset la fonction des tissus mous et la mobilite des articulations est considerée comme de grande importance Les indications pour la reduction ouverte, les connaissances, chirurgicales requises, l'analyse des complications des echecs sont presentees l'emploi des fixations internes dans les fractures, ouvertes, sont discutees ainsi que les resultats obtenus

Des comparaisons de statistiques sont donnees pour appuyer les conclusions de l'auteur que dans les grandes métropoles, la fixation interne precoce des os fractures, fermée ou ouverte, est accompagnée de peu de risques et obtient une ambulation et une restauration des fonctions plus rapidement que les anciennes methodes

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Automammaplasty*

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AUTOMAMMAPLASTY is the total reconstruction of the breast from the individual's own tissue, or more specifically, the formation of a second breast from a single remaining breast, and should demand our attention because society today is being alerted constantly to the menace of cancer

Daily there appear articles in medical journals and in the lay press warning of the tragedies that the disease brings During the past 10 years, a tremendous amount of research has been done on the subject Recently through newspaper, magazine, and radio publicity, further impetus has been given to investigations in the field This in addition to educational programs of various medical associations, has made the layman "cancer-conscious"

Cancer of the female breast has been of special concern to investigators for many years The reason for this is, that cancer of the breast is, by far, the greatest cause of mortality and morbidity, insofar as the female is concerned Cancer of the breast plays no favorites as to age However, its frequency of occurrence may be classified into three general age groups In order of diminishing frequency, these age groups are first, of greatest frequency, from the age of puberty to about 40, or during the usual childbearing age second, during the menopausal age from 40 to about 55, third, and least frequent, in the involutional stage from 55 on

In the past few years there has been an increase in the number of cancer cases This increase, however, is "apparent" I say "apparent" advisedly Due to wide publicity given the subject of cancer, many more women come earlier and more often for periodic examinations Thus, many more malignancies are discovered

We have learned that a biopsy should be made of every suspicious nodule found in the breast Because of the frequency of biopsies, many early cancers are discovered Since there have been so many younger females who have had breast biopsies, many more young girls have been subjected to radical breast amputations

It is customary in nearly all modern institutions for a biopsy to be done of all lesions before a radical amputation is performed The type of biopsy varies with the surgeon Some do a needle or punch biopsy, while others do a frozen section on an excised gland

Needless to state no matter what type biopsy is done there is a possibility of error, which varies according to the type of biopsy performed Of course punch or needle biopsies are subject to greater error than are those done by direct excision Rapid frozen sections are also subject to technical errors as well, as to the experience and ability of the pathologist Many of you, doubtless, have had one report on a frozen section which was followed in a few days by a contradicting diagnosis based upon a paraffin section. The error might have been in the selection of different parts of the same specimen, in poor staining or detail of the frozen section, or it might be due to erroneous diagnosis of the first specimen Unfortunately, complete resections are done frequently on the basis of such misjudgment The patient, of course, is left with one breast

The pathological report may justify the radical resection The histologic picture of the tumor corresponding to grade two shows that 66 per cent of the cases result in a five-year cure Grade three tumors show five year cures in 28 percent of the cases In a series of 94 cases of cancer of the breast, subjected to complete operation, 45 percent showed a five-year cure, according to L Clarence Cohn Five year cures approaching 90 percent can be expected from treatment by radical operation for patients harboring grade one

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Simmons has made an analysis of a group of 84 patients who presented axillary nodes clinically. In 72 of these cases, cancer was proved by pathological examination, while in 12 cases, the nodes were inflammatory. This is an error in original diagnosis of 14 percent. It was indicated by this analysis that cases of cancer of the breast in which the axillary nodes are not diseased, patients living without clinical evidence of cancer, may be considered permanent cures at the end of five years. But, in patients with positive nodes at the time of operation, 19 percent will die of recurrence by the end of five years.

The frequency with which benign tumors account for radical mastectomies is impossible to estimate. Difference of medical opinion as to the classification of such conditions as "hyperplasia of duct epithelium" or "atypical hyperplasia in lobules" as transitional changes or early stages in malignancies, also account for a large number of breastless women.

Whatever may be the cause for radical resection, it must be noted that in a good percentage of cases, these women have a life expectancy of at least five years, and in some instances, an expectancy of 10 or 15 years.

The reaction of women to radical breast surgery varies greatly. Some women find this fate in life unbearable, and their emotional reaction turns them into seriously maladjusted persons. Quite often, domestic relations are affected to the point of separation and divorce.

In the majority of cases, loss of one breast does not affect the individual in such a serious manner. These women usually resort to the use of some type of fabricated material, shaped in the form of a breast, manufactured by many brassiere companies, or the latex or sponge rubber prosthesis described by Adolph Brown, of Chicago. These artificial replacements are employed for several reasons: first, the device gives the woman symmetry; secondly, they provide a foundation upon which to wear clothes; thirdly, the replacements lessen psychological factors such as mental depression, neuroses, and inferiority complexes; fourthly, these devices are inexpensive. But have you ever spoken to a woman who wears falsies?

Some women do not react to the mental shock as greatly as they do to physical. Many women normally have large, hypertrophied breasts. When these women lose one breast, they become top-heavy on the normal side. The weight of this side produces a pain on the opposite side, due to the attempt of the individual to maintain her balance.

Much has been written concerning plastic surgery of the breast. This material has dealt primarily with surgery to increase the size of the breast, or surgical techniques for reduction of hypertrophied breasts. Where there was asymmetry in the two breasts or where the breasts were infantile in type, procedures such as the injection of paraffin (long obsolete) or the introduction of fat grafts have been used.

However, little attention has been given to the reconstruction of the breast where there is complete absence of one of the breasts owing to injury or surgery. This is due, perhaps, to the fact that many of our conferees have felt that the span of time between the original surgery and the terminus was not sufficiently long to warrant the effort or expense. It may also have been felt that knowledge of the technic, up to this time, was limited or unsatisfactorily developed to warrant the risk of reconstruction.

It has already been stated that there has been, in the past few years, a significant increase in the number of women undergoing complete resections of the breast. The trend will probably continue. Also it has been shown that many of these women have breasts removed which show a low-grade malignancy, or no malignancy whatsoever, and consequently have an increased life span following resection. Too, improvement in technique and operative thoroughness has increased the time interval of five and 10-year cures.

With these facts in mind, I should like to state that when the evidence in the case proves the necessity for treatment, and when the proper tissues are available, I am of the opinion, that the patient is entitled to any and all procedures, whether they be medicinal, physical, psychical, surgical, or all combined, in order to give the individual a brighter outlook on life. The remainder of this paper is concerned with a procedure of automammaplasty which lends itself to relatively safe and universal employment towards this end

Literature on automammaplasty has been perused thoroughly The sole description of such an operation is one described by Max Thorek in his book *Plastic Surgery of the Breast and Abdominal Wall* which includes photographs and details of the operation performed by Wilhelm Reinhardt This shows a bisection of the breast and describes in stages, the transplantation of the medial half of the breast, to the opposite side Five stages were employed to form the new breast

A careful analysis of this procedure shows it to be based upon the principle of transference of a single, open pedicle flap Under certain qualifying circumstances this would be suitable and, to date, with no other information available, would be justifiable It does however, have several disadvantages

1 The one remaining breast is immediately disfigured. Both halves become endangered and there is the possibility that both halves may not survive

2 The operation would be satisfactory *only where there is a small pedunculated* breast.

3 When the open pedicle flap is employed, there is the danger of secondary infection

4 The pedicle flap, composed of gland and fat tissues, is a compound pedicle and is subject to the danger of an unconditioned circulation and the difficulties which such tissues have in adjusting themselves

The technic of automammaplasty which this paper proposes may be used for round pedunculated, small, or large breasts The number of major procedures are limited to six The danger of slough is avoided because multiple pedicles are employed The tubular arrangement of the pedicles prevents the danger of secondary infection and shrinkage And, with this procedure, one reconstructs the remaining breast first, thereby assuring the patient of having one good breast even in the event of failure in the reconstruction of the second breast

Following is the history relevant to the case under discussion A patient was referred to the Plastic Clinic from the Cancer Clinic of the White Memorial Hospital, Los Angeles, which is associated with the College of Medical Evangelists

The patient, 36 years old, had had a breast removed to eliminate a grade two tumor Healing was normal, and she had good, adequate covering of the affected side The patient was extremely unhappy because of her disfigurement Her carriage was poor owing to a constant pull on the right side She could not dress well The remaining breast was very large and heavy Psychologically, she was morose, depressed and had a severe inferiority complex

When the patient appeared at the Plastic Clinic her physical condition was thoroughly checked Figures were cited to her with respect to the percentage of recurrences and the number of years of life expectancy were given her

The dominant concern of the patient was to have her remaining large breast reduced Also, she showed much interest in the possibility of having another breast constructed, and she inquired about the feasibility of such a procedure The information given her at that time relative to automammaplasty, was a description of the Reinhardt technic The possibility of failure of both sides was explained to her Since she was already miserable over the loss of one breast, this prospect increased her apprehension An alternative proposed to her was the reconstruction of the remaining breast to make it smaller It was suggested that she think the matter through carefully

In the meantime, I devoted considerable time in an effort to discover a procedure which would assure readjustment of the one breast and also make possible the formation of a new breast from the discarded tissue

The following is a step by step description of the technic which was devised.

STAGE ONE

Markings are placed on the normal breast. The location of the new areola depends upon the height, weight, and the size of the thorax A simple, safe, all around general rule, would be to drop a vertical line from the center of the clavicle, to the chest wall A point six to seven inches from the clavicle, is marked on this line. Then with the Acromion Process as a fixed point, and the radius of six to seven inches, markings are placed at the intersection of this point. With the sternoclavicular articulation as a center, with the same radius, another mark is made. The intersection of these three lines, determines the midpoint of the new areola.

Using the ordinary nipple lead shield, a circular marking is made, with the nipple as

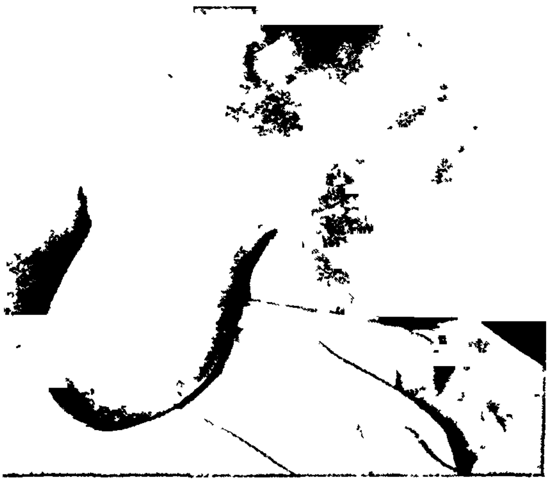

Fig. 1. Front view before surgery. Shows the appearance of the remaining breast after radical mastectomy. Note the hugeness of the breast.

Fig. 2. Side view before surgery.

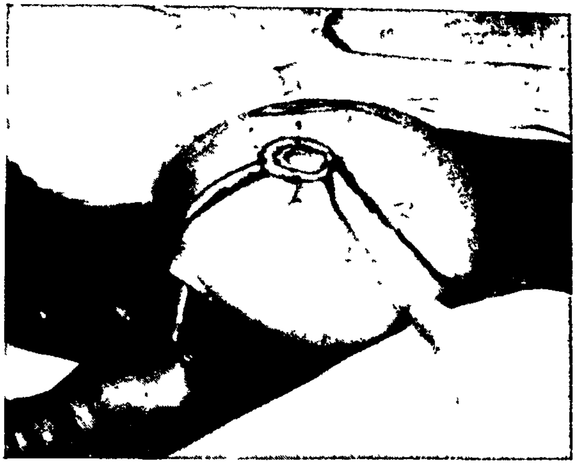

Fig. 3. Markings of breast before surgery. (1) Location of the new areola. (2) Markings around the original nipple. Inner circle shows size of newly formed areola on old breast. The second circular incision shows width of flaps. (3) Shows incision on each side extending from areola flaps to medial side. (4) Shows the anterior flap.

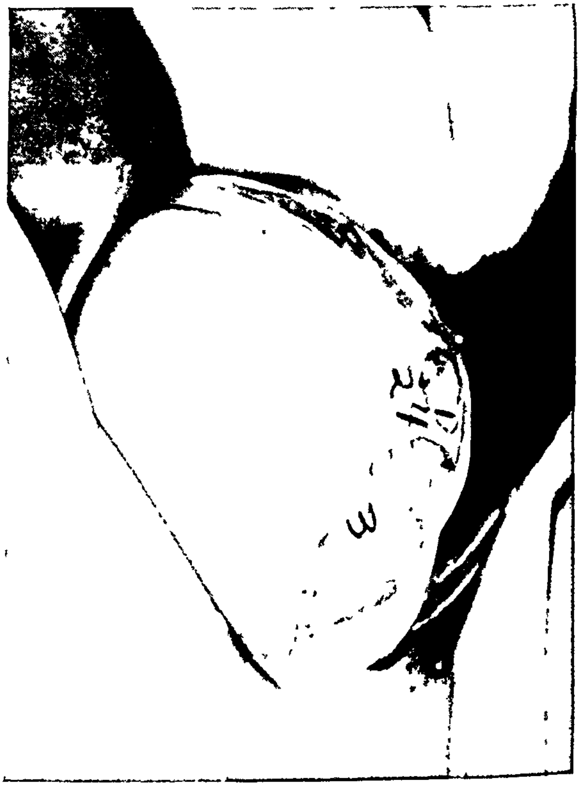

Fig. 4. (1) Shows the areola has been circumscribed. (2) Shows four interrupted silk sutures fastening the margins of the areola to the mammary fascia. (3) Incision has been made thru the skin and superficial fascia on each side. Note: mammary fat protruding (4) Shows the areolar flaps attached to the segment of the breast.

a center. A small medicine glass may be used or free hand marking. The size of these marks must be judged according to the amount of areola present and to the size of the future breast. The next marking about the areola, includes all of the remainder of the areola and is in the form of an inverted U. The arms of the inverted U, passing to the lateral and medial sides of the breast. Another line is made parallel to the last medial and lateral lines.

The assistant then holds the breast in the form of a cone and the incision following the first or central marking about the nipple is made. When the cut reaches the mammary fascia the tissues will retract. Four interrupted silk sutures are then placed about the areola fixing the areola to the mammary fascia to prevent injury to this tissue.

The next incision follows the second areolar marking and extends to the lateral and medial markings of the upper of the two parallel

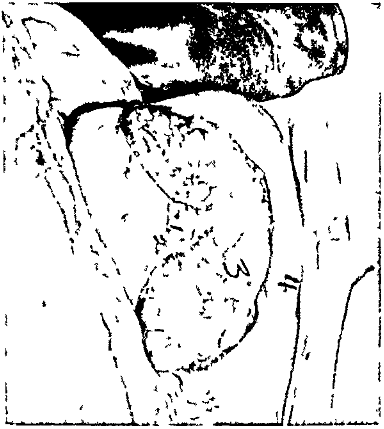

Fig. 5. (1) Shows the old areola and nipple. (2) Shows the areolar flaps which will form the new areola. (3) Breast tissue which has been separated. (4) The upper part of the skin and subcutaneous tissue of original breast.

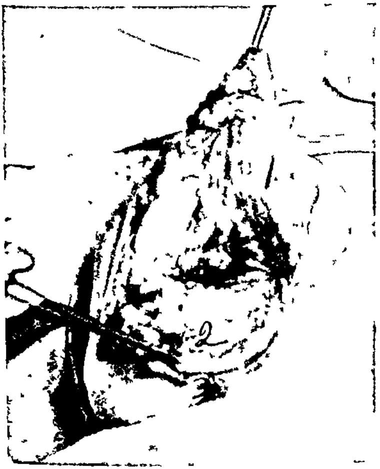

Fig. 6. (1) Shows upper half of original breast with the original nipple attached but the outside of its skin covering. (2) The lower half of the original breast with its original skin covering intact. (3) The areolar flaps free.

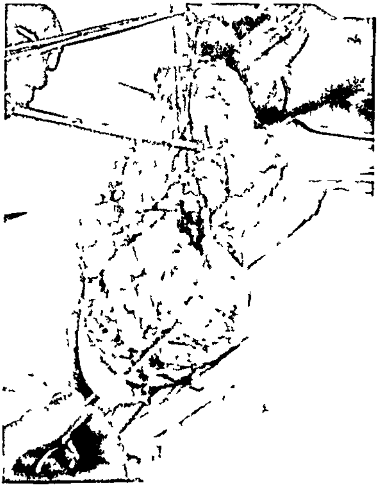

Fig. 7. Shows the reconstruction of the remainder of old breast into a new and smaller one by the formation of a cone. It is at this time when the desired size is established. Raw margins are sutured to each other and the base is sutured to the pector

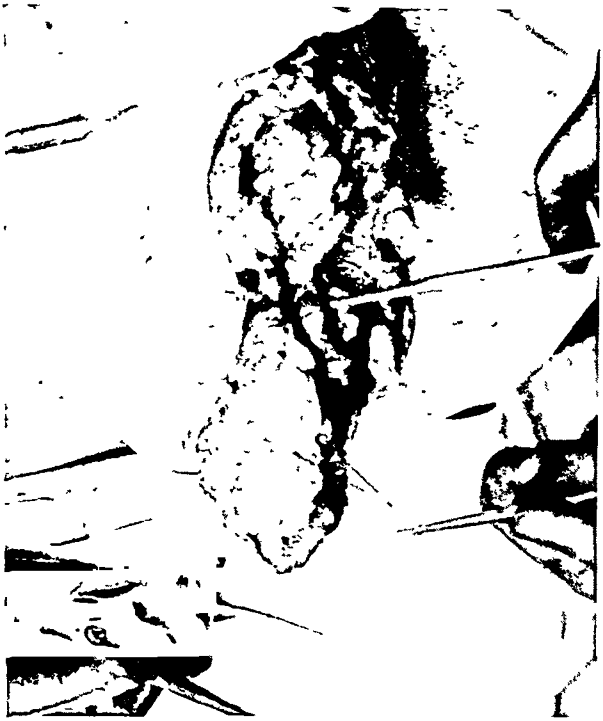

Fig. 8. Side view of Fig. 7.

lines. This incision extends through the skin and fascia, to the mammary fat.

The skin over the upper half of the breast is separated from the breast structure, by blunt dissection, with a lap sponge. This dissection is carried out and up, to free the entire upper half of the breast, and down to the second line of marking below. The areola attached to the skin of the lower half of the breast, is sectioned at the top, thereby producing a medial and a lateral flap, composed of areolar tissue. This will be used in the reconstruction of the areola for the new breast. These flaps are carried down to the area of the second parallel line, of the skin on the lower half of the breast. Bleeders are clamped and tied, with three 0 chromic or fine silk, or fine cotton.

A section of breast tissue, composed of gland and fat, is sectioned from the breast. Much depends upon the size of the breast one wishes to retain, as to the amount that will be left. This section, may be in the form of a triangular section, of various degrees, up to a full half of the breast. Bleeders are clamped and tied.

A wet lap pad, is now placed over the lower half of the breast, and pulled down. The section of breast is made only to the central core of the original nipple area. In this way, all the glands and circulation, to this part of the breast, are left intact.

The cut margins of the breast tissue are then sutured together, with number one chromic sutures, beginning towards the center, placing about three sutures, continuing the sutures, as the surface of the breast is approached. Several sutures are then placed, fixing the breast in the proper height on the chest, by placing the sutures in the pectoral fascia.

The skin is then permitted to drop over the newly reconstructed gland tissue. It is fitted to the new breast, and sutured with interrupted three 0 silk sutures, in a vertical direction.

The two areolar flaps attached to the lower half of the breast and skin, are now sutured in a circular manner, to each other. The lower skin margin of the upper half, and the skin

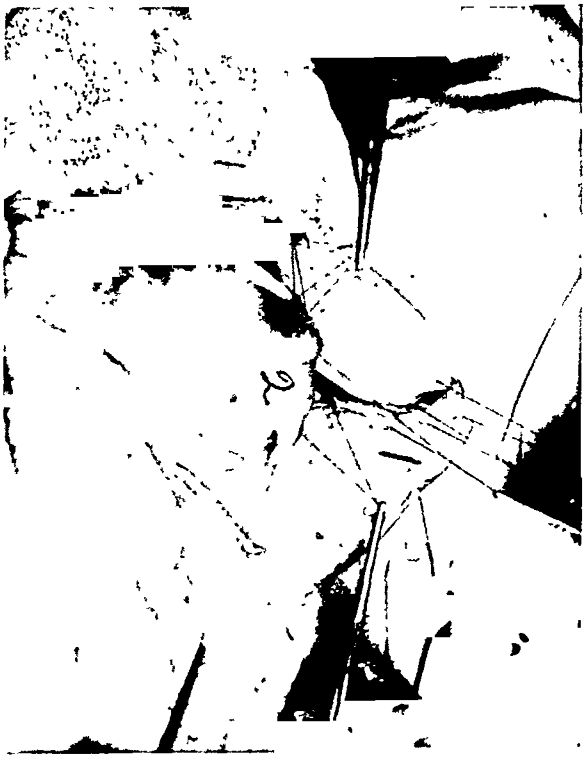

Fig. 9. (1) Shows skin closure over the old breast after formation of a glandular cone. (2) Sutures inserted but not tied in the lower half of the breast.

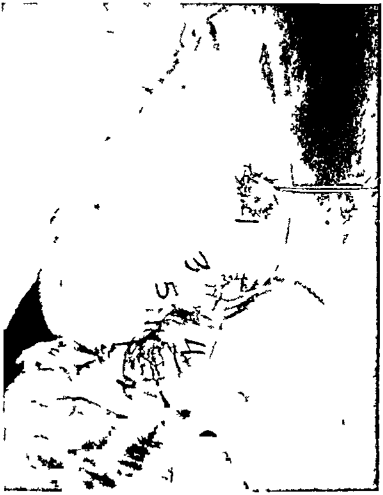

Fig 10 (1) Original areola in its new location as predetermined at beginning of the operation (2) Areolar flaps from original areola, and now attached to the sectioned part of the breast and sutured in the form of an areola (3) Part of the original areola which was left attached to the original skin and which could have been used to make the flaps more serviceable (4) Suture line of lower section of the breast (5) Suture line closure of the upper part of the breast

margin of the lower half, are now sutured to each other

The location of the new areola of the first breast is now reviewed An oval incision, with the long axis in a transverse diameter, and the size equal to less than the diameter of the first original incision, about the original nipple is made, and the section of tissue removed If the gland tissue was sutured in the proper position, the original areola and nipple will spontaneously protrude into this new opening If it does not, a slight readjustment of gland tissue, by placing a tuck here and there, will produce the desired result The four silk fixation sutures first inserted, are now removed The areola is sutured to the skin margins with four 0 silk interrupted sutures

This completes the first stage The dressings are important Two small penrose drains

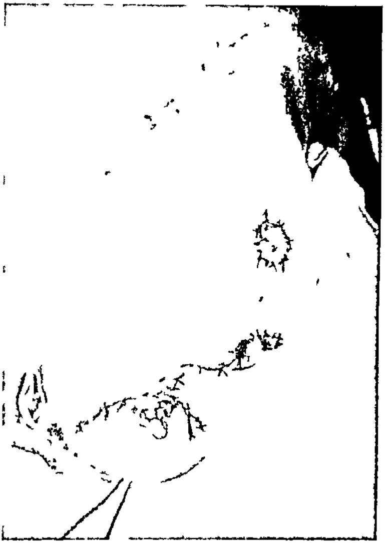

Fig 11 Shows a view from below The upper breast has been completed and the remainder of the tissue completely enclosed in skin tombe used for the new breast

inserted, one in each angle Vaseline gauze strip is placed over the suture lines, then a gauze pack must be placed between the upper, and lower half of the breast, with a reasonable amount of pressure, to produce a line of separation A cup or brassiere to fit over the upper half is used, or an elastic bandage may be used to fix the dressings in place

SECOND STAGE

The second stage may be done three weeks later At this time, the upper incision is made along the transverse suture line between the two breasts, and separation extended to the chest wall Bleeders are clamped and tied The lower incision is made in the original inframammary line, but leaving a pedicle medially and laterally, of sufficient width, to sup t the length of the tube formed

The skin about the lower half of the breast is separated from the enclosed gland, and fat, for a small distance, and these skin margins are sutured together, thereby forming a closed tubed pedicle flap. The skin of the lower part of the upper breast, is now brought under the tubed pedicle, and sutured to the skin of the chest wall. Dressings are applied with care being taken to avoid any pressure upon the flap attachments.

OPERATION—SECOND STAGE

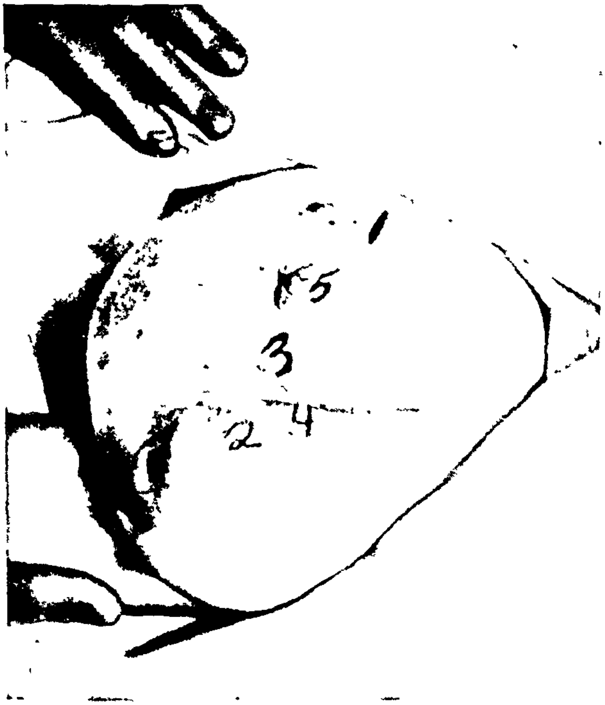

Fig. 1. Appearance of breast before second stage surgery. (1) Areola of first breast. (2) Region of flaps of original areola and which will be used for new areola. These flaps, because of their disproportion, have already sloughed. (3) Healed vertical incision. (4) Healed transverse incision. (5) Region of remnants of old areola, still present.

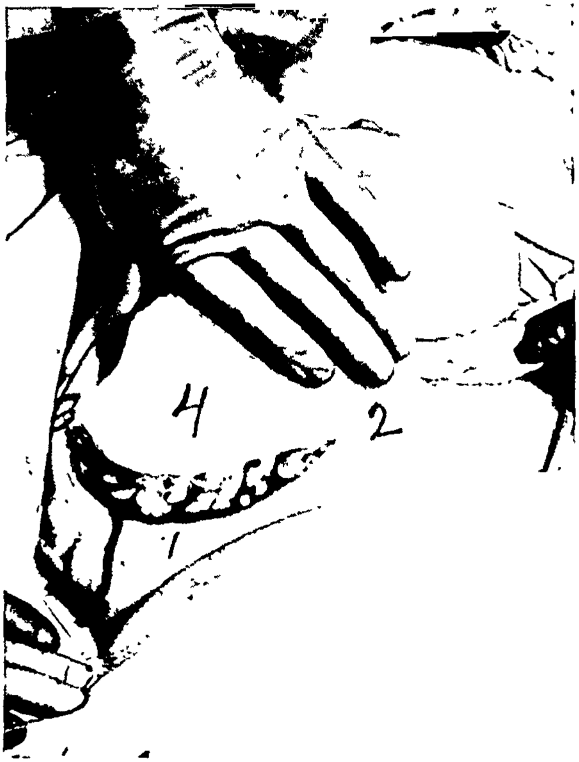

Fig. 3. (1) Lower half of breast elevated and incision in the submammary line of the original breast. (2) Attached medial end of pedicle. (3) Attached lateral end of pedicle. (4) Lower half of the breast or the segment which will go into the formation of the new breast.

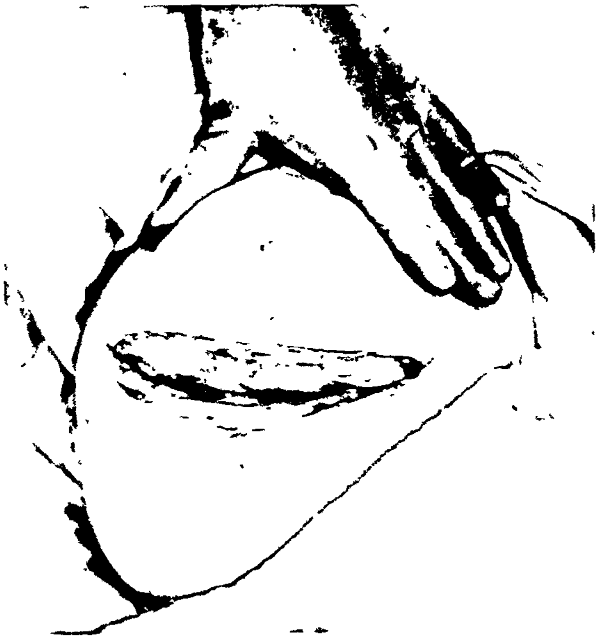

Fig. 2. Shows incision in the region of the first transverse scar between the two sections of the breast

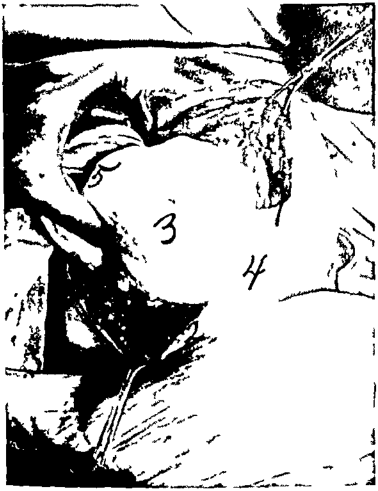

Fig 4 (1) Upper incision and separation of the lower breast from the upper breast (2) Lower incision showing separation of the lower half of the breast from the chest wall (3) Breast to be transferred (4) Medial pedicle (5) Lateral pedicle

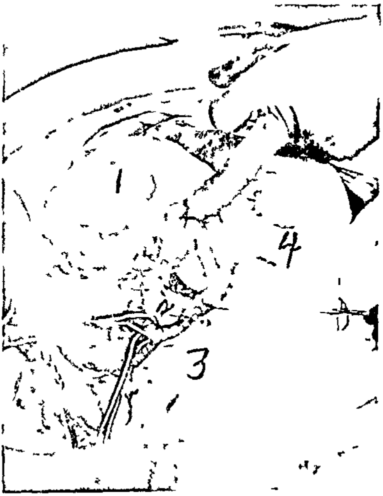

Fig 5 (1) Shows new segment of breast completely separated from chest wall (2) Shows skin from the inferior portion of the now newly formed right breast being pulled under the pedicle breast to be attached to the skin of the chest wall (3)

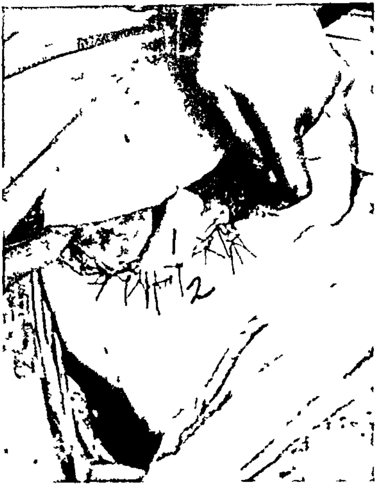

Fig 6 (1) Shows skin of newly adjusted breast being sutured to the skin of the chest wall at the inframammary incision (2) (3) The new section of breast tissue being held away from the chest wall

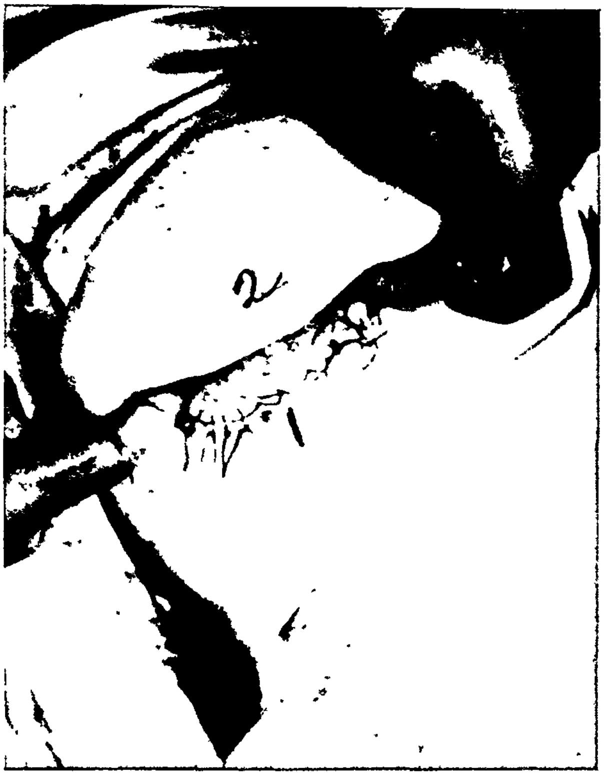

Fig. 7. (1) Shows the skin surfaces completely sutured. (2) Shows the formation of a tubed pedicle.

THIRD STAGE

The third stage is delayed for four to six weeks. Tests may be made, to determine the condition of the circulation to the tube. The tube may also be conditioned, after the first four weeks, by occluding the circulation to the lateral flap, at various intervals, for various periods of time. The length of the tube is then measured, and tested to determine the approximate location of the transferred end. A trap door is made at this area. The lateral end of the pedicle is amputated and sutured into the trap door. The donor area is closed. Dressings applied.

FOURTH STAGE

At least six weeks are permitted to pass, before this stage is done. This stage requires more conditioning of the circulation, and is the most critical and dangerous of all the stages. The same procedure is carried through, as in stage three. The length of the pedicle is measured again, a trap door is again made, except that as much of the pedicle as possible is attached to as much of the chest wall as possible.

FIFTH STAGE

Four weeks later, the remainder of the pedicle is opened, and sutured to the chest wall.

SIXTH STAGE

Rearrangement of the tissues of the new breast, to give the form of a breast. Removing tissue from the original breast, if it is too large, and transferring it to the new breast, or discarding it.

OPERATION—THIRD STAGE

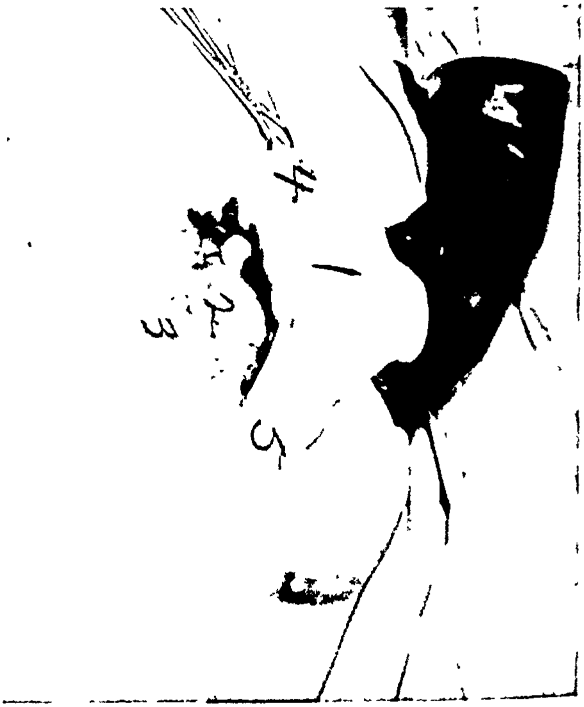

Fig. 1. (1) Tubed pedicle separated from the chest wall. (2) Inferior pole of newly constructed breast sutured to chest wall (3). (4) Lateral attachment of pedicle. (5) Medial attachment of pedicle.

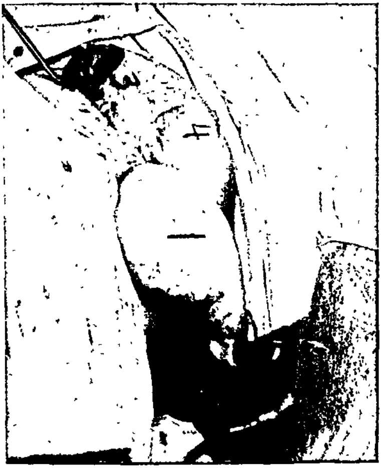

Fig. 2. (1) Shows tube pedicle separated from lateral attachment of chest wall. (2) Shows the area from which pedicle was amputated. (3) What was the lateral end of the pedicle being held in the hand and will now become the medial side of the newly formed breast.

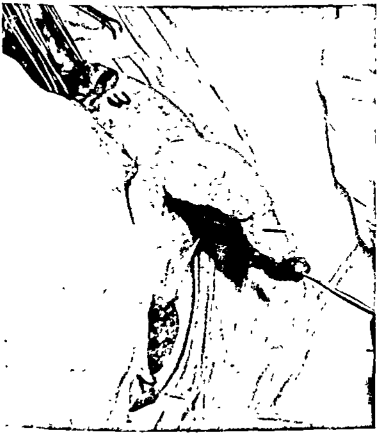

Fig. 3. (1) Shows medial end of the original tube pedicle. (2) Shows the newly formed trap door on the left side of the chest. (3) Shows old attachment of the tube pedicle. (4) Detached free end of tube pedicle twisted to be inserted into newly created bed.

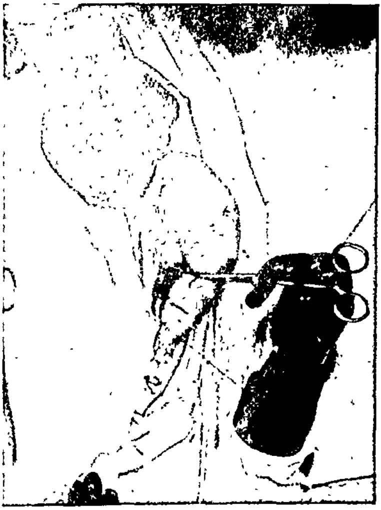

Fig. 4. (1) Shows open end of tubed pedicle being sutured to the prepared area on the left side.

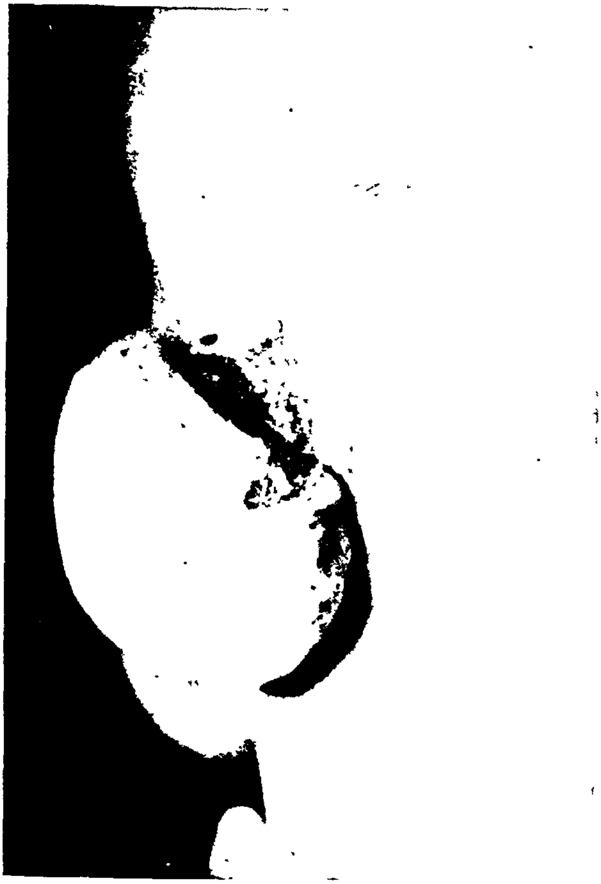

Fig. 5. Shows the tubed pedicle sutured to left chest wall.

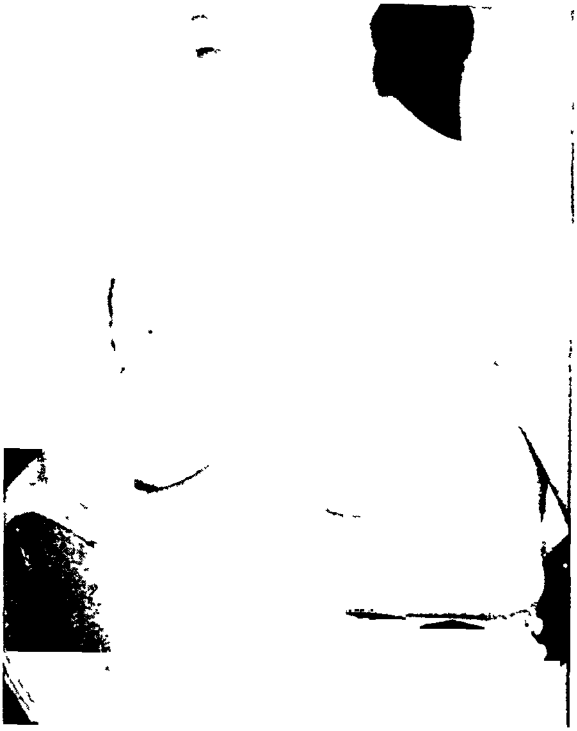

Fig. 7. Final result.

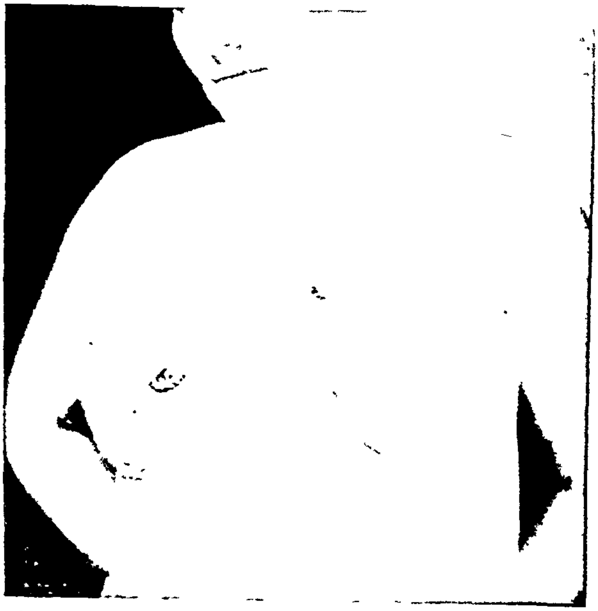

Fig. 6. Shows a comparison of the two breasts before the readjustment procedure.

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Case Report

Vesicovaginal Fistula of Tuberculous Origin*

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AND L. H. RODRIGUEZ DIAZ, M.D.
CARACAS, VENEZUELA

THIS report refers to the study and treatment of an interesting case of urinary tuberculosis in a girl, aged 14, who was admitted to the urological department of the Vargas hospital complaining of urinary incontinence. Examination revealed the presence of a large vesicovaginal fistula, and the findings in the case have led us to consider the possible tubercular origin of this fistula. Cases of vesicovaginal fistula of proved tubercular origin are rare, and medical literature does not record many similar instances.

The presence of a vesicovaginal fistula in a virgin, without any operative history preceding it, could not fail to arouse our deepest scientific interest. A congenital origin due to embryological developmental anomalies could be discarded, since such malformations would not fit into the picture of the present case, and the best hypothesis to explain the excretion of urine *per vaginam* through the intact hymen would be the abnormal implantation of the ureter at some level in the vagina. But this hypothesis was at once eliminated by the conducted endoscopic examination which demonstrated the presence of a vesicovaginal passage.

Since this fistula was not of obstetric or operative origin, nor was it the result of the destructive action of physicotherapeutic agents such as diathermy, electrocoagulation or radium, and since there was no evidence of vesical or genital malignancy (and no apparent possibility of a vesical calculus or a foreign body) we had to conclude that the abnormal genito-urinary passage must be the result of an inflammatory process which had partially destroyed the vesicovaginal wall.

Now, the complete clinical study of this case together with the operative and anatomopathologic findings, plus the history of a chronic urinary infection with hematuric cystitis, which determined a tubercular pyonephrosis of the left kidney with total loss of its renal function, was the only means left to determine the direct relation between the patient's proved urinary tuberculosis and the present vesicovaginal fistula.

Lacking any other satisfactory hypothesis and adhering to a logical pathological interpretation of the phenomena observed, we believe that we are justified in assuming the etiological relationship of the morbid processes presented in this case, and in considering the vesicovaginal fistula as the result of vesical tubercular lesions.

Tubercular lesions of the vesical wall may lead to its perforation. Though exceptional, it is an anatomopathologic possibility. Few well-proved cases have been recorded.

Anatomopathologic studies show that tubercular ulcerative lesions are usually shallow and do not penetrate deeply; as a rule, a fibrosclerosing periulcerative infiltrative tissue reaction acts as a protective process and prevents perforation. However, both extra and intraperitoneal perforations have been reported, the latter especially serious, for they precipitate the picture of an acute abdominal emergency, while the former give rise to vesicovaginal or vesicorectal fistulous lesions.

In 1933 Mertz carried out an important revision of the problem. Shurer in 1929 published his observations of an intraperitoneal perforation. Alton in 1931 mentioned another case. Moroney in 1943 and Scholefield in 1946 enriched the bibliography regarding this problem.

Now, returning to our own case, x-ray study revealed complete functional integrity of the right kidney but also showed a discrete distention of its ureter. Cystoscopy showed that this ureter emptied very close to, almost on the

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* From the Urological Service of the Vargas hospital, Caracas, Venezuela.

six minutes. Globular sedimentation time: 1st hour 95, 2nd hour 114, index 76. Wassermann and Kahn reactions negative. Blood urea 0.18 per 1000. Blood glucose 1.30 per 1000.

On June 16, 1947, with gas anesthesia, we did an exploratory lombotomy and found an extensive pyonephrosis with perinephritis and periureteritis. We performed subcapsular nephrectomy, which was tedious and laborious, but the patient made a very satisfactory recovery. The pathologist's report states "Macroscopically, kidney weighs 120 Gm., measures 10 cm. in its longitudinal axis, 5½ in the transverse and 4½ in the anteroposterior: surface appears lobulated. On hemisection we find the pelvis very much dilated, holding in its interior a large amount of a reddish yellowish liquid. The pelvic wall appears smooth in spots, whereas it is distinctly rough in others. The ureter is widely dilated and surrounded by connective tissue. The medular and cortical zones have practically disappeared, with only occasional layers of a thickness of 4 mm. remaining. Microscopically, many tubercular follicles are observed, together with a widespread purulent inflammatory process."

Diagnosis: renal tuberculosis and chronic pyelonephritis.

On June 25, 1947, the search for Koch's bacilli in the urine was negative. July 8, the inoculation of guinea-pig with urine was negative. July 14, the red blood count was 3,560,000 cells, hemoglobin 9.52 Gm., (62 percent) and the globular value was 0.88.

On Aug. 12, 1947, with gas anesthesia, we performed right ureterocolostomy according to Coffey's No. 1 technic. The immediate postoperative course was satisfactory, but 13 days after the operation the patient presented intestinal hemorrhage accompanied by generalized edema and loss of consciousness, which compelled us to employ the most energetic measures at our command, such as blood transfusions, serum injections, cardiac tonics, coagulants, oxygen, etc.

New laboratory investigations on Aug. 29 yielded the following information: red blood count 3,200,000, hemoglobin 8.7 Gm. (57 percent), globular value 0.89. Leukocytes 8,100, eosinophils, four, rod-shaped six, segmented 66, lymphocytes 18, monocytes six. Blood urea 1.33 per 1000. Three days later the hemorrhage ceased and the patient recuperated from her attack of acidosis and renal insufficiency, and laboratory investigations on Sept. 2, showed blood urea 0.28 per 1000, red cells 2,000,000, hemoglobin 3.60 or 27 percent, globular value 0.67, leukocytes 14,400, eosinophils seven, rod-shaped four, segmented 62, lymphocytes 23, monocytes four and some abnormal red cells: macrocytosis with hypochromia.

After the present report was written, we were informed that our patient's mother has been admitted to our hospital on account of severe hemopthisis, and that the radiologic diagnosis was bilateral tubercular lesions in evolution.

The condition of our patient is at present satisfactory.

SUMMARY

A case of urinary tuberculosis in a girl 14 years old, in which a left-sided pyonephrosis and an incurable vesicovaginal fistula resulted, is here described. The treatment employed consisted in a left nephrectomy and a right ureterocolostomy.

RIASSUNTO

Descrivono e discutono un caso di tubercolosi urinaria in una ragazza di 14 anni. Avendo la malattia condotto all'insorgenza di una pionefrosi e ad una fistola vescico-vaginale, gli AA. hanno fatto recorso ad una nefrectomia e ad uni ureterocolostomia.

SOMMAIRE

Un cas de tuberculose urinaire chez une fille de 14 ans présentant une pyonéphrose du côté gauche et une fistule vésicovaginale, est décrit avec commentaires. On enleva le rein gauche et on fit une unétérocolostomie du côté droit.

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Postoperative Use of Heparin in Prophylaxis Against Thrombosis

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STOCKHOLM, SWEDEN

IN RECENT years, significant progress has been made in the treatment of postoperative thrombosis The sudden appearance of an embolism without preceding signs of thrombosis is still, however, a great surgical danger Therefore, complete control of thrombosis will be possible only when an effective prophylactic is available Heparin has played a large part in obtaining improved results in the treatment of frank thrombosis, it is of the greatest importance that the possibilities of heparin as a prophylactic should be realized

In prophylactic heparin treatment, the amount of heparin administered and the intervals between injections is of the greatest importance both from the point of view of results and from that of economic convenience From the clinical therapeutic point of view there is no definite opinion as to dosage The reason for this, at least in part, is that the theory of heparin activity is still not fully understood In clinical practice it has been the custom to give relatively large daily doses, which seem fairly safe, but how nearly these doses approach the optimum remains uncertain

The effective use of heparin demands a sufficiently large quantity On the other hand an overdose means unnecessary expense in a treatment that is already costly, and at the same time involves an increased danger of hemorrhage, at least in the case of postoperative prophylaxis Furthermore, very frequent injections cause the patient inconvenience and place heavy demands on the hospital staff These facts seem to indicate that a decrease in the dosage is desirable but security must be placed before everything else, and should always be borne in mind in determining the dosage routine

In Sweden, reports on surgical patients prophylactically treated have been published by Crafoord (1937) and Strombeck (1942) and on gynecological obstetrical patients by Wetterdal (1941) and Leissner (1942) For the most part, the table constructed by Crafoord and Jorpes has been followed This table prescribes a dosage of about 250 mg every 24 hours, divided into three daily doses of 50 mg and one night dose of 100 mg The duration of the treatment varies between five and 10 days

In the aforementioned series no case was reported in which thrombosis occurred during treatment After treatment thrombosis occurred in [illegible] cases The series were, however, from a statistical point of view, rather small Crafoord's covered 325 cases, Wetterdal's 127 Leissner's 117 and Strombeck's 40 Judging from these series this dosage would seem to provide a safe protection against thrombosis during treatment The question remains whether it was the relatively large quantities in themselves that prevented thrombosis In settling this question it is of value to note how coagulation time is affected during a 24 hour period by the quantities and the total dosage mentioned

From Crafoord's, Hedenius' and Wilander's studies of the effect of heparin on coagulation time in human subjects, it is known that a dose of 50 mg prolongs coagulation time above the normal for about three hours Prolongation after a dose of 100 mg of heparin lasts about four hours If, from these results, we construct a 24 hour curve based on the most frequently used doses in postoperative prophylaxis to date (50 mg three times daily, together with a nightly dose of 100 mg), we find that even with this relatively large total daily dose of 250 mg, there are intervals (totaling 11 to 12 hours during a 24 hour period) when the coagulation time is almost down to normal, and when the treatment, from [illegible] view of prolonging coagulat[illegible]d by relatively

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[*] This paper and the following papers were presented at the Sixth International Assembly International College of Surgeons Rome May 16 24 1948

inaccurate instruments and methods, is ineffective.

Furthermore, although these quantities and doses seem effective against thrombosis during treatment, it is obvious that they cannot provide protection for more than a short period *after* treatment.

This provokes another question: To what extent does this regimen provide unnecessarily high doses, and how much is it possible to increase the intervals in the observable activity of heparin. Furthermore, one wonders whether the heparin may not have a prophylactic effect against thrombosis that does not show itself in our relatively inaccurate measurement of coagulation, yet plays an important role during certain short periods.

My opinion is that, at least from the prophylactic point of view, there is no need for such a prolongation of coagulation time as is produced by the relatively large daily quantity of heparin just mentioned, and also that, in any case, this overdosing and overprolongation of coagulation time does not necessarily contain an additional guarantee against the development of thrombosis. In my opinion, since the normal level of heparin is low, the addition of even a small dose should have a favorable effect and possibly, in most cases, produce as good results as would the larger quantity.

Partly to support this theory and partly to make a contribution to discovery of the optimum dose, I have studied the prophylactic activity of a daily dosage of 100 mg. of heparin. This was given in two injections, each of 1 millilitre containing 50 mg., morning and evening. The treatment was begun on the day after operation. It was continued until the patient got up, or at most for 10 days. The series included patients with operative areas susceptible to thrombotic-embolic complications; areas in the fields of abdominal, urnogenital, renal and prostatic surgery. Since thrombosis and embolism are rare in young persons, the treatment was confined to patients over 30 years of age. The normal five percent vitrum-heparin preparation was used.

The table contains data on all the prophylactically treated patients during a three-year period and all patients treated nonprophylactically during the same three years. These two groups are nearly identical in number; the first group includes 1,266 patients and the second group 1,254.

The difference in the frequency of thrombosis and embolism is considerable. Of the

Abdominal Operations During Three Years*

Organs	No prophylaxis			Prophylaxis with heparin 50 mg.X2		
	Cases	Cases of thrombo-embolism	Dead of pulmonary embolism	Cases	Cases of thrombo-embolism	Dead by pulmonary embolism
Ventrical and duodenal	111	3	1	186	0	0
Hernia	178	3	2	263	1	0
Appendicitis	623	7	0	318	1	1
Colon-rectum	28	3	2	25	0	0
Gallbladder	102	5	2	255	1	1
Ileum-jejunum	31	0	0	15	0	0
Pancreas	3	1	1	1	0	0
Urinary system	66	1	1	74	0	0
Genital system	112	2	1	129	0	0
Total	1254	25	10	1266	3	2

*The investigation is from St. Gorans Sjukhus, Stockholm.

treated patients, only three had thrombo-embolism during treatment. Of these, two died of pulmonary embolism. After the treatment (from six to 18 days) symptoms of thrombo-embolism occurred in eight cases. In the 1,254 cases in which heparin was not used, thrombo-embolism occurred in 25 with 10 of the patients dying of pulmonary embolism.

It is proved that the heparin treatment used provides an important protection against thrombo-embolic complications. The protection is not, however, complete.

So far as the risk of postoperative hemorrhage is concerned, prophylactic treatment with the larger heparin doses of 250 mg. increases this risk so much that such treatment is contraindicated. With the smaller dose (100 mg. per 24 hours) the risk of hemorrhage is reduced to a minimum.

SUMMARY

A postoperative prophylactic treatment with heparin in accordance with the aforementioned system (100 mg. per 24 hours, comprised of a morning and evening dose of 50 mg. each, commencing on the day after the operation and continuing until the patient leaves his bed, or at the most for 10 days) gives an important protection against the appearance of thrombo-embolic complications during treatment.

The risk of hemorrhage due to administration of this quantity of heparin has proved to be extremely small or even nonexistent.

SUMARIO

El uso profilactico de la heparina durante el tratamiento post-operatorio por el metodo que se ha descrito en este articulo (100 mgms. de heparina en 24 horas en dosis de 50 mgms. manana y noche, comenzando desde el dia despues de la operacion por no mas de diez dias) da gran proteccion contra las complicaciones trombo-embolicas durante el tratamiento. El peligro de una hemorragia por la heparina ha sido en nuestra experiencia tan pequena que se le puede considerar como no existente.

SOMMAIRE

Un traitement prophylactique post-opératoire avec l'héparine selon le système précédemment étudié "100 mg. pour 24 heures, 50 mg. le matin 50 mg. le soir, débutant le jour avant l'opération et continuant jusqu'à ce que le malade qui est au lit se lève. Ce traitement fournit une protection importante contre l'apparition de complications thrombo-emboliques durant le traitement.

Le risque d'hémorragie due à l'administration de cette quantité d'héparine est minime ou plutôt n'existe pas.

Blockage of Splanchnic Nerves for Relief of Pain and Splanchnic Dystrophy*

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CERTAIN observations on patients with visceral pain of varying origin (colic, cancer, peptic ulcer) dramatically relieved by blockage of the splanchnic nerves were reported in a paper, "Algias Esplánenicas," read before the Mexican Academy of Surgery. Along the same lines, new observations were made on the trophic effect upon the viscera produced by blockage of these nerves, suggesting the possibility of functional and anatomical restoration by this method of the viscera affected. First observations and later findings, together with discussions[1] and interchange of ideas with some South American surgeons, resulted[2] in the publication of the book "Mortal Pains."

The original conception has been broadened now by new experiences. The work, although personal, has been sustained, approved and has stimulated other workers and investigators in South America. It is hoped that new fields for clinical and physiologic research will be opened thereby. This paper is a brief summary of the fundamental observations. It does not pretend to be a formulation of doctrine; it simply presents some elements for further study and research.

GENERAL CONSIDERATIONS

One of the best methods of studying organic function is the suppression of the nerve supply to an organ. This method has exposed interesting fields of research in abdominal pain. The effect of blockage of the splanchnic nerves by novocaine and alcohol has an effect lasting sometimes more than two months. If repeated, the effect can be made to last indefinitely. It has been demonstrated on several occasions that the splanchnic nerves carry pain impulses from the viscera of the thoraco-abdominal regions and that their blockage stops the pain immediately.

On clinical grounds it was suspected that the sympathetic nerves have a dystrophic effect in certain pathologic conditions, such as peptic or trophic ulcers—diseases that can be treated by splanchnic nerve blockage. This observation was supported by the work of Leriche and Dogliotti,[3] who have been able to obtain temporary relief by this method in certain cases of diabetes mellitus.

These facts, together with the well-known trophic effect of the sympathetic nervous system in the presence of varicose ulcers and endoarteritis of the lower limbs, so often relieved or cured after sympathectomy reinforced the idea that splanchnic nerve blockage can produce a similar trophic effect, through vasculomotor paralytic dilatation, upon the pancreas, the kidneys, the bowel or the heart.

Other effects of blockage are the relaxation of spasm in the biliary, urinary and digestive tracts, as well as in the coronary vessels. The treatment also benefits some atonic conditions in the gallbladder and large intestine.

In practice one often encounters severe abdominal pain referred to the epigastrium or to the upper part of the abdomen, with no visceral lesion detectable. Such a condition is sometimes called solaritis. In one such case, which provided one of my earliest experiences with the effectiveness of splanchnic nerve blockage, immediate relief of a long standing painful condition was obtained. Alcohol was employed. The date of treatment was Feb. 8, 1941, and by Oct. 10, 1944, at which time the case was reported to the Mexican Academy of Surgery, the pain was still absent and the patient apparently cured.[1] Since then our records have been enriched by similar successes.

PEPTIC ULCER

For this study, only those patients with a clinical and roentgen diagnosis of uncomplicated peptic ulcer were chosen and treated. After blockage of the sympathetic nerves, the pain and the burning sensation disappeared.

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* Presented at the Sixth International Assembly, International College of Surgeons, Rome, May 16-21, 1948.

Very often the relief lasted so long as to be considered a permanent cure One of the earliest cases was that of a factory worker treated on Oct 11, 1942 and cured up to the present time This case was reported at the Mexican Academy of Surgery

More recently, 20 patients have been treated and controlled clinically and roentgenologically Because of the peculiar periodicity of pain in this disease it is necessary to continue observations for a longer period and on a greater number of patients before jumping to conclusions However, up to now results have been constantly favorable so far as the control of pain is concerned

BILIARY COLICS

This syndrome is of frequent occurrence and sometimes requires a blockage as a purely *symptomatic treatment for temporary relief* In one case a unilateral blockage was performed on the right splanchnic nerve Failure followed this treatment Since then it has been considered necessary to treat both sides This case also tends to confirm the idea of the functional unity of the whole sympathetic system in the abdominal cavity

PANCREATITIS

In early acute pancreatitis the pain is dramatic and agonizing Sustained anesthesia of the splanchnic nerves was employed for relief In cases of pancreatitis without great organic damage, when recovery was possible, progressive improvement was observed after several such treatments, probably due to a trophic effect *upon the gland or to paralytic vasodilatations* over its area The control of pain in pancreatitis provides a sounder basis of study and observation over a longer period

An illustrative case is that of Mrs F V de Z, aged 68, alive and cured at the present time On Sept 25, 1946, she had a sudden, intense and dramatic pain in the upper part of the abdomen Morphia and other sedatives were useless, after a careful clinical examination a diagnosis of acute pancreatitis was made and the splanchnic nerves were blocked with novocaine alcohol The pain was relieved almost immediately After the depressing effects of narcotics (previously administered) had receded the patient recovered quickly In a few days, with the help of a blood transfusion and an adequate diet, she was normal and *apparently cured Four months later she* suffered a second attack Similar treatment was given with the same spectacular results, but with less general bad effect since the treatment was applied earlier and without preliminary administration of narcotics Then followed a period of complete relief, and five months later a new crisis occurred A new blockage was performed and the result is an apparent cure up to the time of writing

From this and other cases (13 in all) it is concluded that in addition to the control of pain blockage of the splanchnic nerves produces a trophic change in the pancreas, probably by means of a paralytic vasodilatation

DIABETES MELLITUS

Patients suffering from diabetes of pancreatic origin were also treated by novocaine alcohol blockage with prolonged observation when a series of such treatments were given

In these cases the favorable results are probably due to a trophic change produced through paralytic vasodilatation, with effects similar to those observed in ulcers of the lower limbs after periarterial sympathectomy The case of Mr J M aged 40 could be given as an example This patient presented a complete clinical picture of diabetes The blood sugar was 200 mg glycosuria with 26 gr per 1000 and polyuria of 3000 cc On Feb 28, 1946, blockage with alcohol was performed The glycosuria disappeared, clinical recovery was obtained, and the blood sugar level became normal Periodic checkups were made on the blood and urine In July 1947, after excess in diet and ingestion of alcohol, diabetic symptoms and signs reappeared A new treatment was given and control of the disease has been maintained up to now

In summary, spectacular results were obtained by blockage of the splanchnic nerves in certain cases of hemorrhagic pancreatitis and diabetes The fact that the treatment can be repeated without danger is important One patient with acute pancreatitis treated a year and a half ago, represents the most nearly permanent cure Cure of pancreatitis is possible of course in cases with discrete hemorrhagic lesions, if s [illegible] impacted in

Wirsung's duct the situation is less hopeful. Thirteen cases of pancreatitis have been treated successfully by this method.

RENAL COLIC

Several patients with pain of renal origin were treated by alcoholization of the sympathetic nerves. J.C.G., a male patient with a horseshoe kidney, who had been suffering for four years with colic, had been treated without success in several North American clinics. Blockage was performed and the improvement was so great that the patient was soon able to reassume his normal activities. In the presence of calculi, this treatment is mainly symptomatic and preoperative.

ABDOMINAL CANCER

In August 1944, a patient with inoperable visceral cancer was treated by blockage of the splanchnic nerves. Since then, excellent and sometimes unexpected results have been obtained in many cases. Blockage is indicated only when the neoplasm is confined to the viscera affected. It is unsuccessful when there is invasion of adjacent structures.

In several cases it has been possible to follow the progressive but painless advance of the disease until death, which usually occurs from obstructions of the digestive tract by the tumor mass. It is interesting to learn that Prof. Felix Mandl, of Vienna, has also been working along these lines.

HYPERTENSION

The book "Mortal Pains" carries mention of the work done by the Portuguese surgeon Sousa Pereira, who has tried novocainization of the splanchnic nerves as a preoperative test, to establish the indication for resection of the splanchnic nerves in the treatment of high blood pressure.

This method, although logical, is not so successful as it was, except at the beginning, mainly because the effect of novocainization lasts only four hours and the novocaine in itself is hypotensive. Alcoholization, on the other hand, remains effective sometimes for over two months. It is very useful not only as a preoperative test but as a curative procedure. It is indicated: (a) during the actual crisis of hypertension when a quick effect is desired; (b) to diminish the risk of operation; and (c) as a treatment of hypertension by means of a series of blockages at intervals of at least two months.

It is important to note that in the present series, the desired depressive effect on the blood pressure has been obtained regardless of the level at which the blockage was done. The sympathetic system is a functional unit that within certain levels (paravertebral chains) acts as a whole.

Blockage must be done on both sides, because failure usually follows unilateral treatment. In cases of hypertension, blockage at the level of the lowest dorsal vertebral is the treatment of choice, perhaps because of a more direct effect over the renal areas.

The case of R. V. de M., a woman aged 70, is illustrative because of the association of hypertension and diabetes. This patient showed an excellent response of both diseases after the treatment. For a long time she had been suffering from hypertension, with frequent hemorrhages. The systolic blood pressure was 290 max. and 220 min. but often these figures went up in a very alarming way. In May 1947, a bilateral blockage of the sympathetic nerves was performed at the end of the first lumbar vertebra. The blood pressure was lowered to 130 max. and 90 min. Glycosuria disappeared and blood pressure has remained unchanged up to the present.

A marked asthenia, such as that observed in cases of Addison's disease, followed the treatment. It lasted about two weeks, after which everything became normal. At present, the blood pressure is within normal limits and the diabetes under control.

Another interesting case is that of F. R., a young man who suffered from malignant hypertension. Doctors at the Seguro Social had predicted his death. After treatment by this method he obtained relief for periods of two months at a time, sometimes prolonged by serial treatments. The blood pressure is quite satisfactory, and the frequent retinal hemorrhages from which he had been suffering have not reappeared. Six blockage treatments were performed in a period of 18 months. In another case, in which there was associated diabetes, a profound asthenia followed the hypertension produced by the treatment.

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Treatments were applied at the level of the 12th dorsal vertebra, in the hope of a possible direct effect over the renal area

Prof Felix Mandl a pioneer in this field of work, reports a favorable response from 42 percent of the patients treated by this method The experience in this clinic is less extensive, but the statistical results are slightly higher owing perhaps to the different technic used We have employed larger doses than Professor Mandl and the treatments have been repeated more often However further observations must be made before a final statement can be released as to the percentage of cures and the final results in cases of hypertension

HYDRONEPHROSIS

Blockage of the splanchnic nerves has been recommended in the treatment of this condition Quick and sustained improvement and some cures have been obtained in patients treated by novocaine alcoholization J J C, a man aged 25, with a long history of urinary disturbances and low back pain with associated muscular spasms, had been submitted to innumerable treatments at home and abroad, mainly in the United States, this was seen at this clinic April 22, 1946 After an excretory urogram had been made his condition was diagnosed as hydronephrosis On the 26th of the same month, alcohol blockage was performed Soon after the treatment of relief, the symptoms were observed Up to now the patient is free from subjective disturbances Roentgenologic improvement has been reported

DYSMENORRHEA

A fair number of observations have been made, with results similar to those obtained by the Cotte operation The probable trophic effect of the method should be emphasized here

CHRONIC CONSTIPATION AND DIGESTIVE ATONY

We have some observations of selected cases of these diseases with good results In one case there was a history of lifelong constipation with digestive atony and malnutrition Blockage improved the digestive function and relieved the constipation, and the patient's general condition now is very good

TECHNICAL CONSIDERATIONS

The injection should be performed with t patient in the prone position When lastin effects are desired, inject 10 cc of alcohol each side

The novocaine alcohol infiltration is not fr from danger and the patient must be hospita ized to control any immediate complicatio after treatment One very unpleasant accide is infiltration of the posterior roots which ma cause very severe neuritis If the patie notices paresthesia along the lower limbs du ing the injection it is wise to withdraw th needles and change its direction The injectio is more difficult when the prevertebral fat ti sue surrounding the splanchnic nerves is ant Neuritis or neuralgia produced by accide should be treated by the ordinary means an by diathermy

COMMENT

This preliminary work has been much encouraged by comments of colleagues at hom and abroad Some of them including Gutierrez, believe that with this method a newer an wider horizon has been opened Dr Alfons Asenjo, director of the Neurosurgical Institute, Hospital del Salvador, Chile is enthus astic about the method As has been state time and further observations are needed t establish its value The work will be continue and further statistics compiled Evidence a present indicates that blockage of the splanchnic nerves offers a new and efficient means t relief and possible cure

RIASSUNTO

Questo lavoro preliminare è stato molt incoraggiato da commenti nazionali ed inter nazionali Taluni, compreso Gutierrez, ritengono che il metodo proposto dall'A apra l strada a nuovi e più vasti orizzonti Altri fra i quali Alfonso Asenjo, Direttore dell'Istituto Naurochirurgico (Ospedale del Salvatore) Cile, si ne dichiarano entusiasti I lavoro d'indagine continua, onde fornire pi larghe statistiche ma fin d'ora, il blocco de nervi splancnici sembra costituire un nuov e valido mezzo palliativo, se non addirittur curativo

SUMARIO

Este trabajo preliminar ha sido animado por los comentarios favorables de colegas tanto aqui como en el extranjero. Algunos de los colegas, incluyendo el Dr. Gutierrez, creen que este metodo ha abierto horizontes nuevos y amplios. El Dr. Alfonso Asenjo, Director del Instituto de NeuroCirujia del Hospital del Salvador en Chile esta muy entusiasmado aserca de este metodo. Como ya se ha dicho solo el tiempo y mas observaciones son necesarias para establecer su valor.

Sin embargo, la evidencia al presente indica que el bloqueo de los nervios esplacnicos ofrece un metodo nuevo y eficiente para producir el alivio, y posiblemente la curacion.

SOMMAIRE

Ce travail préliminaire a été beaucoup encouragé par des commentaires de collègues du Chili et de l'étranger. Quelques uns comme le Dr. Gutirrez, sont d'avis que cette méthode nous offre un nouvel et plus large horizon. Le Dr. Alfonso Asenjo, directeur de l'Institut Neurologique à L'hospital se Salavador du Chili, est très enthousaste de cette méthode. Ainsi qu'il a été dit précédent, le temps et d'autres observations sont nécés aires pour établir définitivement sa valeur. Le travail se poursuit et d'autres statistiques seront à établir. Te semble evident à present que le blocage des nerfs splanchniques affre soulagement nouveaux et efficaces des moyens de et aussi de guérison possible.

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Lumbosacral Flexion Arthrodesis[*]

O ANDERSON ENGH, M D , ALLEN M FERRY, M D , AND
FORREST M SWISHER, M D
WASHINGTON, D C

THE authors have performed approximately 300 lumbosacral fusions, with the earlier operations following the Albee or Hibbs methods Later multiple granules or chips were used During the past five years a wedging bone block has been inserted in the posterior space between the fifth lumbar spinous process and the sacrum It appears that better results are being obtained by the latter method No definite conclusions, however, can be made, since an insufficient lapse of time has occurred for determining the value of the procedure

The operation is indicated for unstable lumbosacral spine, degenerated or protruding discs, displacement or arthritis of facets, narrowing of the intervertebral foramina, and posterior displacement of the fifth lumbar vertebra In most of the patients it appears that flexion at the lumbosacral area tends to correct the condition For that reason our more recent operations have utilized the insertion of a thick bone graft in the posterior lumbosacral space

Operative Procedure. The patient is given a thorough scrubbing with soap and water for 10 minutes prior to making an incision which extends from the third lumbar vertebra to the midportion of the sacrum The operation is performed with the patient in the prone position with the low back flexed on a hinged table The incision is kept in the midline so as to avoid the muscles which bleed freely All the ligaments and muscles are denuded from the spinous processes and lamina of the lumbosacral region as far as the lateral apophyseal articulations

After the capsule has been removed from the posterior lumbosacral facets, the posterior lumbosacral facets are denuded of their cartilaginous surfaces using a small curet Drill holes are made from the outer lamina through the facets to the lateral processes of the sacrum using a No 31 drill The direction is downward and outward and this is done with the patient maintained in the flexed position Screws $\frac{7}{8}$ inch to $1\frac{1}{4}$ inches in length are inserted through the drill holes of each lumbosacral facet It will be noted that no motion is possible after a screw has been placed on each side The flexion at the lumbosacral area is maintained

A second incision is then made over the posterior iliac spine and using subperiosteal dissection a graft, approximately two inches in length and one inch in thickness, is removed from the thickest portion of the bone The graft is notched at its midportion on each side so that it can be mortised into the lumbosacral space posteriorly Before this is done, however, the spinous processes of the fifth lumbar vertebra and sacrum are slightly undercut so as to obtain a keystone shaped recipient area The lamina are also freshened so that the graft will lie against raw bone

Numerous small chips can be placed deep in the lumbosacral space These chips can be obtained from the donor site of the ilium The notched graft must be driven into the recipient area *with force* so that it is firmly wedged in position If properly done, the bone block cannot be moved It is important that no more bone be removed from the spinous processes than is necessary to freshen the surfaces so that these processes will not be weakened It is also recommended that the screws be placed through the facets prior to the insertion of the bone block since the area is more stable and since technically, it is an easier procedure It is important, also, that a thick graft be taken which can be driven deeply against the lamina, offering a strong substantial graft The closure is by the usual method

No cast is applied unless it appears that a stable wedging graft has not been obtained This [illegible] happens if the sacral spinous process is underdeveloped. If a cast is applied, it should be a bilateral hip spica cast extending to the supracondylar region of the femora.

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[*] From the Anderson Clinic, Washington, D C

Sixty patients have been operated on using the wedging flexion bone block. The last 39 of these patients had screws inserted through the lumbosacral facets. It is the authors' opinion that immobilization is more firm when screws are used with a mortised bone block. It is believed that the screws maintain good fixation for a period of approximately six to eight weeks during which time union of the graft may have been accomplished. Ordinarily, the patient is kept in bed for a period of three weeks following the operation. No corset or other support is used. It is believed that arthrodesis takes place in a period of four to six months permitting normal activity. Until that time, the patient is advised to avoid any direct strain to the low back. Fusion between the fourth and fifth lumbar vertebrae is not recommended in the average case since it is our opinion that the pathology exists almost entirely in the lumbosacral area.

There has been considerable controversy regarding lumbosacral pain and its associated sciatica. Some feel that arthritis involving the ligaments and the apophyseal joints is the most common cause. Relaxation of ligaments with unstable lumbosacral joints is often suspected. In the past six to eight years the role of the degenerated and protruding intervertebral disc has had increased attention. Regardless of which of these causes is present, the position of flexion tends to correct it. If the patient has a protruding disc, flexion causes the disc to return to a more normal position. This was demonstrated by Love and Walsh in the laboratory who noted that hyperextension caused the intervertebral disc to protrude markedly backward. They also noted the return of the protruded disc back into the intervertebral space almost level with the posterior surface of the vertebral bodies during flexion. Similar observations were made by Schactenschneider. Very frequently at the time of operation one notes the degree to which the disc protrudes backward by extending the patient on the operating table. In the case of the degenerated disc, narrowing of the interspace takes place, causing a subdislocation of the facets. Ligamentous strain results and frequently arthritis occurs in the apophyseal joints. The flexion bone block returns the facets to a more normal position and in the thinned lumbosacral intervertebral space the posterior portion of the space is widened. It is obvious that diminution of the intervertebral foramina will follow disc degeneration or displacement of the facets and pressure is relieved on the nerve roots by literally opening the foramina when the patient is brought into the flexion position.

In most of the conditions mentioned it can be understood that ligamentous strain is apt to follow the mechanical derangement. When one recognizes the abundant nerve supply to the lumbosacral ligaments, the deep seated pain can be understood. This area is the site of strain with symptoms initially referred to the low back and later followed by referred pain into the sciatic distribution. This disorder requires flexion for relief of symptoms and for that reason the patient usually stands or lies with his back flexed and frequently pulls his knees up against his chest while lying in bed. This is the reason why acute cases are treated successfully in the hyperflexed position on a Gatch bed, elevating the head and thighs so as to flatten the low back. Most of these patient are cured by conservative treatment and in our series only five percent have required surgical stabilization.

Credit should be given Breck and Basom, Bosworth, Moore, King, for their methods of fusing the low back area in flexion. Interlocking grafts of various types have been described by them. Breck and Basom stress the need for conservative treatment in flexion for an adequate period of time but state that surgery must be resorted to in a small percentage of patients. A mortised interspinous bone block is used restoring the intervertebral interspace to normal, reducing the accompanying subluxation and giving internal fixation to the routine spine fusion grafts. King obtained rigid fixation by placing screws through the lateral articulations with the lumbar lordosis partly obliterated by lowering both the head and foot ends of the table. Bosworth inserts a clothespin graft which is taken from the ilium or tibia and has the ends notched out to receive spinous processes at either end of the fusion area. Moore uses a self-locking prop bone graft with a tibial graft notched at both ends and an opening in its midportion which fits over the fifth spinous process

Regardless of which method is used the principle is the same Some surgeons because of their training and experience have found a particular type of fusion more successful in their hands than other types Many surgeons prefer an Albee or Hibbs fusion since these are more universally used and have been more popular in the past It is entirely possible that a Hibbs or Albee fusion combined with screw fixation may be very effective Although we have not used the latter methods that is with screw fixation, such a series would be very informative and valuable However, one must be very conservative in judging his results and should not be overenthusiastic about any new procedure which attempts fusion of the lumbosacral area

Homogenous bone can be used for grafting this area It has been shown that homogenous bone taken from the ilium or upper tibia can be cut in long thick strips, two to three inches in length, and kept in a deep freeze and used when required Very little reaction takes place and studies of the operated area at a later date show good union Although the average orthopedist hesitates to use bone other than autogenous bone, the advantages of homogenous bone must be admitted since it simplifies the procedure The author has had very little experience with these grafts but it is our opinion that this form of graft wedged into the lumbosacral space deserves real consideration When one realizes that the bone graft in any instance acts only as a scaffold, he can see its advantages It appears likely that in centers in which there is a bone bank more extensive use of this form of grafting will follow

Results Sixty patients have been operated on using the flexion bone graft Twenty one of these patients were fused without the use of internal metallic fixation and in 39 patients, a combined method with screw fixation to the facets was used Most of these patients have been checked clinically and by x ray films postoperatively at periodic intervals It appears that better results are obtained with the combination of a flexion bone block and screw fixation Three of our patients have had infections which had eventually subsided These occurred where a single incision permits a communication between two relatively deep wounds, making the control of infection difficult Most of our patients have been checked by straight AP and lateral x rays but more recently we have been following the recommendation of Bosworth of taking films in flexion, extension, and lateral deviation A determination of the success of the arthrodesis can be better determined by such films since these positions will reveal failure of attachment to the lumbar or sacral structures

SUMMARY

Arthrodesis of the lumbosacral spine should be performed in flexion in the average chronic case with low back pain which may be due to displacement or arthritis of the facets, narrowed intervertebral foramina, relaxed lumbosacral joints, disc degeneration and protrusion and backward displacement of the fifth lumbar vertebra Arthrodesis in flexion tends to correct the abnormalities without requiring excision of the responsible factors The flexion bone block utilizes the principles of successful bone grafting that is suitable grafting material (iliac bone), compression and immobilization The use of screws through the facets reinforces the immobilization obtained by a mortised bone block

SUMMARIO

L'arthrodèse de la colonne lombosacrée doit être exécutée en flexion dans la moyenne de cas chroniques avec douleur du bas dos qui peut être dû au deplacement ou à l'arthrite des facettes de foramens intervertébraux resserrés d'articulations lombosacrées relachées de dégénération des disques avec saillie de ceux ci, et de déplacement en arrière de la cinquième vertèbre lombaire L'arthrodèse en flexion tend à corriger les anomalies sans demander l'excision des facteurs responsables La greffe osseuse en flexion utilise les principes généralement admis c'est à dire, l'emploi de matériel convenable pour la greffe (l'os iliaque), la compression, et l'immobilisation L'emploi des vis à travers les facettes renforce l'immobilisation obtenue par une greffe osseuse mortaise

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INTERNATIONAL COLLEGE OF SURGEONS

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In connection with the celebration of Hippocrates Day on October 23, the International College of Surgeons announces the award of a $100 Government Bond for the best essay on "The Meaning of Hippocrates in the Medical World of Today." Although the award is offered specifically to men of the medical profession anywhere in the world, there is no restriction as to eligibility; manuscripts submitted by non-professional writers will also be considered. Dr. Skevos Zervos, noted Greek physician and authority on the life and work of Hippocrates, will head the judges' committee. All essays submitted should be addressed to

HIPPOCRATES ESSAY CONTEST
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Dysuria Due to Retrovesical Echinococcus Cyst

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A FARMER, aged 61, married and a father, was sent to the hospital with a diagnosis of dysuria and retention caused by prostatic hypertrophy. For nearly two years he had had pollakiuria and then difficult micturition, while a perceptible vesical globus had become outlined upon the hypogastrium. Lately micturition had become very difficult and very slow, occurring drop by drop.

Examination. There was an evident hypogastric globus. Vesical catheterization was difficult on account of palpable resistance against passage of the tube into the posterior urethra. 100 cc. of retained urine was extracted, but the hypogastric globus remained in spite of some decrease in convexity.

Rectal examination showed a voluminous prostate of normal consistency and surface. Above it, a tumor with a hard and distended surface was discovered. To combined recto-hypogastric palpation the tumor was spherical and very hard.

The right hypochondrium was the site of a deep scar, which was derived from a previous renal operation for echinococcus cyst. The diagnosis was retrovesical echinococcus cyst.

Cystographic Study. Only 150 cc. of contrast medium could be introduced; nevertheless the cystogram in the anteroposterior projection showed an enormously enlarged bladder, with more liquid at its periphery than in its center. The catheter was displaced from the median line and bent to one side.

The lateral projection showed the peripheral distribution of the liquid. The catheter was bent forward; the cyst appeared to be a roundish mass pushing from behind and sinking into the bladder.

Pneumocystographic Study. When the contrast medium was replaced with a negative contrast (filtered air), a still clearer picture was obtained. There was scanty filling of the bladder. The posterior wall was inverted, that is, it became anteriorly convex because it was pushed by the roundish mass that made the catheter bend forward. The mass was *spherical and appeared to be about the size of an infant's head.*

A new rectal examination, subsequent to *the other, combined rectohypogastric* one, added nothing to the original findings—that is, it was impossible to estimate the resistance of the mass in order to make a positive diagnosis of retrovesical cyst. In spite of the distinct hardness of the tumor and the failure of *resistance perception, a diagnosis of echinococcus* cyst was made, largely on the basis of the previous operation for renal echinococcus. (*This operation had been done six years before* at the Surgical Clinic, University of Bari.)

Once the diagnosis was established the essential question arose: Should the cyst be approached through the perineum or through the abdomen? Though the tumor was easily palpable through the rectum, I preferred the direct, upper, suprapubic approach.

In contradistinction to the opinion of most authors (e.g., Albarran), who prefer the abdominal or intraperitoneal approach, I was able to reach the cyst extraperitoneally and to separate, very carefully, the peritoneal plica from the vesical walls. Having reached the cyst, I was able to expose 0.5 to 1 cm. of its superior wall; then I followed Posadas's classic treatment: aspiration of the liquid and replacement of it with solution of formol, opening of the cyst, extraction of the poligerous membrane, marsupialization, and drainage.

The postoperative course was excellent. After 15 days the patient got up; after a month drainage was discontinued; after 50 days he was surgically recovered and the bladder had regained its normal function.

SUMMARY

This was a case of subperitoneal retrovesical echinococcus cyst following, after six years, a renal echinococcus cyst. The case is instructive because it shows once more that these

prevesical cysts originate not from scolices that reach the prevesical cellular region hematogenically (Walter, Tuffier, etc.) or cross the rectal wall (Charcot) as was formerly believed, but from scolices that drop into the peritoneum at the moment a renal or epiploic cyst is opened incautiously. These cysts have the same origin as intraperitoneal cysts, because the scolices that drop into the serosa migrate through the same into the subperitoneal cellular tissue, according to the mechanism of foreign bodies studied by Marchand and Deve.

In fact, the occurrence of these prevesical cysts is generally simultaneous with or successive to renal or epiploic cysts. Consideration of practical consequences is important. The surgeon who is operating on a renal echinococcus cyst must take every possible precaution to avoid dropping of pathogens into the abdomen.

RIASSUNTO

Espone un caso clinico di una voluminosa cisti idatidea retrovescicale. Dimostra l'interesse del caso non solo dal lato clinico, per il quale la cistografia e lo pneumocisti hanno consentito una diagnosi certa ed un intervento felice; non solo dal lato eziopatogenetico a sostegno della teoria di Devé, dell'insemenzamento del peritoneo e della migrazione degli scolici dal peritoneo nel cellulare sottoperitoneale, contro le vecchie teorie dell'infezione ematogena (Walter, Tuffier) o della migrazione attraverso il retto (Charcot); ma sopratutto dal lato pratico. Infatti il chirurgo operando una cisti addominale deve prendere tutte le possibili precauzioni per evitare la caduta degli scolici nel sacco peritoneale.

SUMARIO

Se ha presentado un caso de quiste retrovesical debido al equinococo y que aparecio despues de seis anos de haber el paciente sufrido de un quiste renal de igual etiologia. Este caso es instructivo porque muestra que estos quistes vesicales no se deben a infestaciones que se han propagado por la via sanguinea (Walter, Tuffier, etc) o por la pared rectal (Charcot); son mas bien debidos a contaminaciones directas del peritoneo durante el momento en que se abren quistes renales o epiploicos con poca precaucion. Estos quistes por lo tanto tienen el mismo origen que los quistes intraperitoneales, y su mecanismo de propagacion es directamente del peritoneo a los tejidos celulares subperitoneales, siguiendo asi el mismo metodo de propagacion que los estudios de Marchand y Deva han confirmado en general con respecto a cuerpos extraneos. Es aun mas un hecho que los quistes prevesicales equinococos generalmente, ocurren simultaneamente o siguen a quistes renales o epiploicos. Esto es de consecuencia muy practica, por cuanto el cirujano que esta operando un quiste equinococo renal debe de tomar toda clase de precauciones para evitar la contaminacion del abdomen.

SOMMAIRE

Le cas rapporté par l'auteur est très intéressant parce qu'il dèmontre de nouveau que ces kystes prévésicaux ont leur origine, non dans des larves transportes par le sang ou propages à travers les parois rectal es, mais des scolices tombant dans le péritoine au moment de l'ouverture du kyste. Ces kystes ont la même origine que les kystes intrapéritoneaux parce que les scolices tombent sur la séreuse, se déplacent dans le tissu cellulaire sous-péritonéal d'après le mécanisme étudié par Marchand, des corps etrangers (Deve).

En réalité ces kystes prévésicaux sont généralement simultanés ou consécutifs aux kystes rénaux ou épliploïques. Celà est d'une importance essentielle et le chirurgien qui opère sur un kyste échinocoque, prendra toute précaution pour éviter de laisser tomber des germes dans l'abdomen.

Surgery of the Inferior Oblique Muscle of the Eye

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THE presence of an anomaly of one of the vertically acting muscles and particularly of an overacting inferior oblique is much more frequent than is usually believed In Anderson's series of cases an inferior oblique muscle was overactive in 30 percent, and an additional 25 percent showed paresis of at least one of the superior muscles, the horizontal deviation actually being a secondary phenomenon [1]

The frequency of overaction of the inferior oblique and the "apparent" absence of other pareses recall to mind that in ocular palsies the findings are essentially different in successive stages of the condition In the early phase of a muscular paralysis, an overaction of the homolateral antagonist occurs, often associated with an overaction of the contralateral synergist For example a paralysis of the right superior rectus produces an overaction of the right inferior rectus (antagonist) and of the left inferior oblique (agonist), similarly, a paralysis of the left superior oblique causes an overaction of the left inferior oblique and of the right inferior rectus From this it is readily comprehended that the overacting left inferior oblique may be due to a paralysis of the right superior rectus or of the left superior oblique The completeness with which the primary lesions of these muscles may recover explains the inconclusive debates between Duane and Bielschowsky and between White and Davis as to the frequency of involvement of the superior rectus versus that of the superior oblique

At a later stage in the paralysis, a secondary contracture of the homolateral antagonist and synergist develops In a paresis of the right superior rectus, a secondary contracture of the right inferior rectus and right inferior oblique occurs

Finally at the postparetic stage, the palsied muscle may have completely recovered, leaving the homolateral contractures and often an inhibitional palsy of the contralateral antagonist The late finding of an inhibitional palsy affecting the left superior oblique explains better than any other the difficulty of determining the original primary paralysis, since a superior rectus paralysis ultimately causes weakness of a superior oblique, and conversely a primary lesion of a superior oblique, ultimately a weakness of a superior rectus From what has been said, an overacting left inferior oblique will be found in early paresis of a right superior rectus or of a left superior oblique, in a later stage of paresis of a left superior rectus or of a left superior oblique and finally an underaction of the same muscle results in the postparetic stages of a right inferior rectus palsy

To add to the confusion, all instances of apparent overaction of an inferior oblique are not postparetic Primary overaction *(Ueberfunktion)*, which is believed to be mostly congenital, is characterized by the absence of vertical deviation in the primary position or in convergence, by no secondary contractures, by the upshoot of the adducted eye in lateroversion, and by the enlargement of the unilateral or bilateral field of ocular fixation in the direction in which the inferior oblique acts best as an elevator [7] From a therapeutic viewpoint, the importance lies in the fact that there is an overaction, for example, of a right inferior oblique and not a weakness of a left superior rectus In these cases, the increase of vertical separation when the head is tilted downward toward the opposite side is decisive for a diagnosis of disturbance of the inferior oblique

Surgical Anatomy of the Inferior Oblique Muscle The short, fleshy inferior oblique muscle has its attachment of origin in a small depression, a little behind the lower orbital rim, approximately 3 mm below and lateral to the upper orifice of the nasolacrimal duct

The muscle passes backward and laterally, in a direction making an angle of 50 degrees with the visual line and in a plane slightly more sagittal than the muscle plane of the reflected tendon of the superior oblique In the region of the inferior rectus, the muscle sheath becomes more important because it projects a falciform expansion temporally, becoming attached to the orbital wall near the lower lateral angle of the orbit, immediately behind the orbital rim. This aponeurotic formation, which has been considered as the check ligament of the inferior oblique, acts not only in the contraction and relaxation of the muscle but also modifies the muscle action during active pull.

The muscular fibers end with or without a short tendon in the lower temporal quadrant of the posterior hemisphere of the globe. The line of insertion is convex on its upper surface, almost coinciding with the horizontal meridian of the eye, and is entirely covered by the lateral rectus muscle. At its termination, a group of fibers creates adhesions between the inferior border of the lateral rectus and the thickened anterior border of the sheath of the inferior oblique. The well-developed arciform expansion, 10 mm. in length and 4 mm. in width, connects the muscle to the inferior orbital septum, behind which lies orbital fat.

The nerve of the inferior oblique muscle, a branch of the oculomotor nerve, enters the muscle by its posterior border, between two orbital fat expansions, near the lateral border of the inferior rectus.

Clinical Physiology of the Inferior Oblique Muscle: In contemporary writings, the inferior oblique is classified as an abductor, on the assumption that its plane passes posterior to the vertical axis of rotation, as does the superior oblique. Actually, however, the plane of the inferior oblique is anterior to the vertical axis of rotation.

As Fischer[12] has shown, extreme positions of rotation of the eyes are the exception in practice, as motions of the head supplement ocular movements of fixation. With this in mind, the true action of the inferior oblique muscle from the primary position is all-important.

In general, extraocular muscles do not act alone, even in purely horizontal movements; auxiliary actions of the vertical muscles will be required to neutralize the small components of elevation, depression and torsion. Even if the muscle were to contract the location of its muscle plane would be constant only if the muscle action were undisturbed or counteracted by an exactly antagonistic action. Neither of these two conditions will be fulfilled, because of the resistance of the system of suspension of the eye and because pure antagonists do not exist.

Pathological Dynamics of the Vertical Deviations: The disturbances of the vertical motor muscles have been classified by Bielschowsky[7] into five groups.

1. *Pure comitant vertical deviations* of pure hyperphoria, which are anomalies of the position of rest. The angle of deviation remains practically constant in all directions of the visual lines, but continuous fluctuations of the compensatory innervation may occasionally simulate paretic lesions.

2. Typical cases of *vertical paretic deviation* are fairly simple to diagnose. In an involvement of the rectus muscles the vertical deviation increases in abduction of the paretic eye, whereas when the obliques are defective the vertical deviation increases in adduction of the eye. In the atypical secondary phase of paresis, the diagnosis becomes difficult and at times impossible, when the paretic muscle regains its function, but the vertical deviation persists as a result of the secondary contractures.

3. The *vertical upshoot of the adducted eye in lateroversion,* either on one side or on both sides, as fixation is transferred to the fellow eye, is due to overaction of the inferior oblique muscles. In the pure primary form there is no disturbance of the muscle balance of the eyes in the primary position. In the diagnostic oblique position of the eyes, however, there is an upshoot of the left eye in dextroversion or a similar upward deviation of the right eye in levoversion. In its secondary form the overaction of the inferior oblique may be part of a delayed symptom of trochlear palsy.

4. The *dissociated vertical deviations,* also called alternating or double hyperphoria, are often combined with comitant deviations.[6] They have been reported in 41 percent of all cases of congenital or acquired amblyopia of one eye. In these deviations, when the eye with the upward deviation fixes and the fellow eye is covered, the eye which has just been covered makes a slight downward movement, accompanied by a similar movement of

the uncovered eye, but immediately after the latter has gained fixation, the covered eye shows an isolated upward movement

5 The last group of vertical motor anomalies include the *combined vertical deviations,* i e , those having the characteristics of several of the other groups

INDICATIONS FOR OPERATIONS ON THE INFERIOR OBLIQUE MUSCLE

The surgical correction of vertical motor anomalies includes[18] (1) strengthening of the paretic muscle, (2) weakening of the associated antagonist, (3) weakening of the direct antagonist and (4) transplanting a portion or a whole active muscle to give motion in a field where it is absent If fusion is present, even in a limited field the paretic muscle should be strengthened in preference to weakening the spastic one

Several measures may be wisely performed in the same operation For example, it may be advisable to shorten the superior rectus when the inferior oblique muscle is lengthened, in order to obtain a more advantageous correction of the eye in the primary position

A Indications for Weakening (Lengthening) the Action of the Inferior Oblique Muscle 1 A unilateral or bilateral hyperphoria or hypertropia, caused by congenital or acquired but stable underaction, paresis or paralysis of the contralateral superior rectus muscle, with or without spasm of the inferior rectus of the opposite eye, depending upon which eye is used for fixation [10] [13] If the paretic eye fixes, the secondary deviation of the contralateral eye is pronounced, a recession of the contralateral inferior oblique is combined with a recession of the contralateral superior rectus If the sound eye fixes, the paretic eye *is hypotropic and a pseudoptosis* is present, the correction includes an advancement of the homolateral superior rectus and a resection of the homolateral inferior oblique

2 A unilateral or bilateral hyperphoria or hypertropia due to paresis or paralysis of the superior oblique with secondary spasm of the inferior oblique of the same eye These cases are usually traumatic

3 An esohypertropia due to a paresis or fibrosis of the lateral rectus with secondary compensatory spasm of the inferior oblique of the same eye This spasm does not occur in paresis of the lateral rectus unless there is a predisposing vertical anomaly of divergence [10]

4 A unilateral or bilateral hyperphoria or hypertropia associated with a primary or secondary overacting inferior oblique muscle in the same eye (upward rotation of the adducted eye in lateroversion) This occasional deviation can be elicited only by testing the eyes in the cardinal positions of gaze

B Indications for Strengthening (Shortening) the Action of the Inferior Oblique: When it is desirable to strengthen the action of the inferior oblique, the muscle may be resected or tucked at the scleral attachment or advanced at the orbital margin

1 A hypotropia associated with a homolateral pseudoptosis in which the upper eye lid follows the downward rotation of the eye, resulting from a paresis of the inferior oblique In paralysis of the inferior oblique muscle, binocular vision may be maintained in a large part of the motor field and when the sound eye fixes the primary deviation may not result in a marked hypotropia [21] Paresis of the inferior oblique may occur alone or in conjunction with a paralysis of the homolateral superior rectus [22] In these cases resection or tucking of the inferior oblique and an advancement or tucking of the superior rectus becomes necessary

2 A hypotropia combined with a cyclotropia due to postoperative paresis of the inferior oblique, especially when fusion exists [4] Typical cases of this type are observed following the accidental division of the inferior oblique from the sclera in operations on the lateral rectus

3 A hypotropia associated with lateral strabismus, specially in exodeviations In such cases, *the vertical component is a hindrance to* any attempt to establish a solid fusion with amplitude, especially in elevation

C Indications for Transplanting the Inferior Oblique Action. Transplantation of the inferior oblique muscle so that it acts as a depressor in paralysis of the homolateral inferior rectus has been successfully performed by Wiener [3] In this isolated paralysis of the oculomotor nerve, the secondary contractures of the inferior oblique and superior rectus p[illegible]uce a marked hype[illegible] In this tech ic, the spastic elevation is weakened as a cerain degree of depression of the eyeball is btained.

ONTRAINDICATIONS FOR OPERATIONS ON THE INFERIOR OBLIQUE MUSCLE

Operations on the inferior oblique are conraindicated in the following conditions:

1. *In slight vertical deviations,* especially hen comitant and readily neutralized by risms placed in the patient's correcting nses.[19]

2. *When there are variations in the amount nd character of the hypertropia,* e.g., in the arly stages of acquired pareses of the vercal acting rectus muscles.[18]

3. *In the absence of a real suppression of the alse image,* but no true diplopia is experinced by the patient, because the false image s so far from the true image that it is not isturbing.

4. *When dissociated vertical deviations simlate alternating or double hyperphoria,* alhough these muscular imbalances do not lend hemselves to operative procedures that would orrect comitant or paretic deviations.[7] This urely innervational anomaly is best treated y conservative measures and the judicious se of orthoptics.

5. *In malinsertion of the medical rectus,* hich is rare, its possibility should be borne n mind when diagnosing an overaction of an nferior oblique.[15] A high insertion of the edial rectus may cause a partial upshoot of he eye in lateroversion.

ECHNICS OF OPERATIONS ON THE INFERIOR OBLIQUE MUSCLE

A. *Lengthening (Weakening) Operations*

(1) *Recession of the Inferior Oblique at Its Scleral Attachment.*[20]

A traction suture is introduced in the epicleral tissue near the limbus at approximately he 8 o'clock position for the right eye, exposng the lower temporal quadrant. With blunt cissors, a curved incision is made in the conunctiva starting 4 mm below the lower edge f the lateral rectus and ending at the upper order of the same muscle 14 mm from the imbus (Fig. 1).

enon's capsule is opened. A strabismus ook is then introduced under the lateral rectus which is pulled upward. The inferior oblique is seized 6 mm. from its attachment by means of fixation forceps.

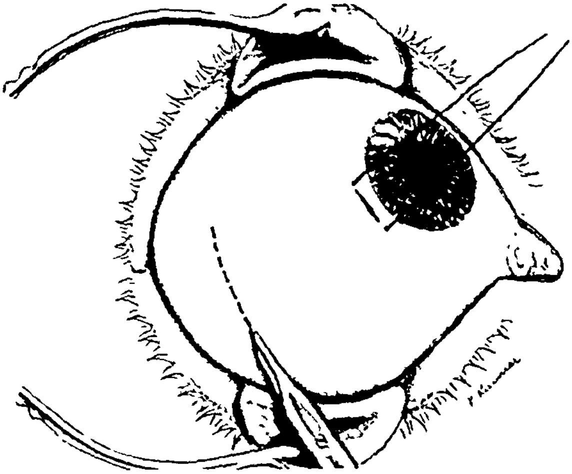

Fig. 1. Recession of the inferior oblique muscle at its scleral attachment. A curved incision is made in the conjunctiva, starting 4 mm. below and ending at the upper border of the lateral rectus muscle, along the equator of the eyeball (14 mm. from the limbus).

Two double-armed sutures are introduced in the muscle 4 mm. apart, as close to the attachment as practicable. A mark is made by slight pressure on the sclera along the edge of the muscle at the desired distance from the attachment, using the points of the calipers as a marker. One needle of the double-armed suture is introduced through the superficial layers of the sclera at the marked point (Fig. 2). Similarly, a needle of the other suture is placed on the other side of the muscle.

The muscle is severed from its attachment to the sclera and allowed to slip downward as the sutures are tied securely along the new line of insertion (Fig. 3).

The lateral rectus is replaced in its normal position.

The conjunctiva is closed by means of single continuous plain catgut suture.

(2) *Myectomy (or Myotomy) of the Inferior Oblique Near Its Orbital Attachment.*[8]

The division or recession of the inferior oblique muscle near its orbital origin may be done by two different routes.

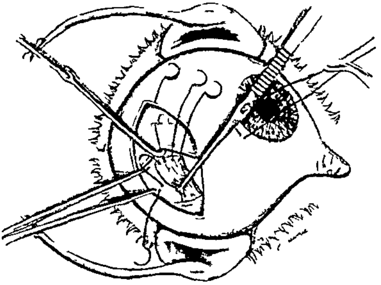

Fig 2. Recession of the inferior oblique muscle at its scleral attachment. The lateral rectus is drawn upward. The inferior oblique is seized with a fixation forceps. Two double armed sutures are inserted 4 mm apart, near the attachment of the muscle. Using calipers, the measurement of the desired recession is marked on the sclera along the muscle border, and the needle is introduced in the episclera at this point prior to the division of the muscle from its scleral insertion.

a *Transcutaneous Approach*[14] An incision 20 mm in length is made through the skin, over the inferior orbital rim, so that its central point is in the same vertical sagittal plane as the pulley of the superior oblique muscle.

By blunt dissection, the fibers of the orbicularis are spread apart exposing the inferior orbital septum, which is incised for a distance of 15 mm. The inferior oblique lies in close proximity.

A strabismus hook is introduced at the temporal end of the incision with its tip in constant contact with the floor of the orbit. The hook is then turned so that its concavity is toward the nose and a sweeping motion is made upward and inward. When resistance is felt, the hook is brought forward, the tip first emerging from the wound, drawing with it the inferior oblique.

The exposed portion of the muscle is freed from all fascial adhesions for about 6 mm. Muscle forceps are applied 5 mm from the orbital floor. In a myotomy, a single division is made proximal to the muscle forceps. In a myectomy, the first division is made with blunt scissors as close as possible to the periosteum (Fig 4). A second division of the muscle is made distal to the muscle forceps. A 4 mm excision of the muscle prevents a possible reattachment of the cut section to the orbital floor.

The opening in the orbital septum is closed with a continuous plain catgut suture. The skin edges are approximated and a continuous subcuticular suture inserted.

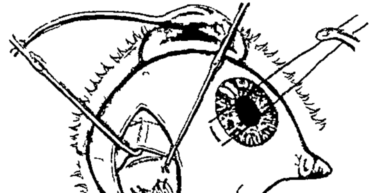

Fig 3. Recession of the inferior oblique muscle at its scleral attachment. After division, the muscle is allowed to slip downward as the two sutures are tied, holding the inferior oblique in its new recessed position.

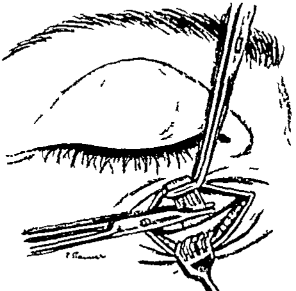

Fig 4. Myectomy of the inferior oblique muscle at its orbital attachment by transcutaneous approach. The skin wound is spread open with rake retractors. A muscle forceps has seized the inferior oblique 5 mm from the floor of the orbit, while the first division of the muscle is made with Stevens scissors.

b. Transconjunctival Approach:[9,16] A traction suture of black silk is inserted in lower eyelid near the margin. Another traction suture is inserted at 6 o'clock in the conjunctiva and episclera at the limbus. By opposing pulls on these sutures, the conjunctival cul-de-sac is completely exposed. An incision 15 mm. in length is made at the lowest part of the cul-de-sac (Fig. 5). The dissection is carried downward and slightly inward toward the orbital rim.

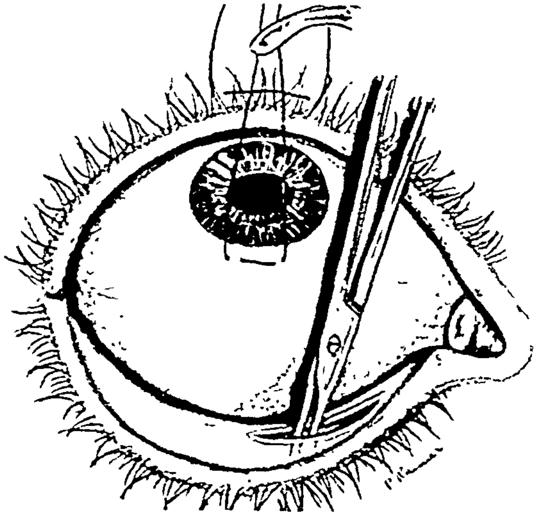

Fig. 5. Myectomy of the inferior oblique muscle near its orbital attachment by transconjunctival approach. Traction sutures are spreading the eyelids apart, as the eye is forcibly turned upward. An incision 15 mm. in length is made deep in the lower cul-de-sac; its center is on the same vertical plane as the trochlea. The dissection is carried downward and inward toward the orbital margin.

A strabismus hook is then introduced in the conjunctival incision, its tip is made to rest on the orbital floor at the temporal extremity of the wound. A sweeping motion is then made so that the concavity of the hook is toward the nose. The hook is moved upward, as the inferior oblique is brought into the wound.

The strabismus hook is replaced by muscle forceps. A division is then made on each side of the muscle forceps. The conjunctival wound is closed with a continuous catgut suture.

B. Shortening (Strengthening) Operations

1 *Resection of the Inferior Oblique at Its Scleral Attachment.*[3]

A traction suture is inserted in the episclera near the limbus in the lower temporal sector. The eye is rotated upward and nasally.

A curved incision is made in the conjunctiva, below the level of the tendon of the lateral rectus, along the equator of the eyeball. Tenon's capsule is opened below. the lower border of the lateral rectus. A suture placed through the lower edge of the lateral rectus retracts the muscle upward, so as to expose the inferior oblique muscle. A bipronged scleral hook[3] is used to create direct traction on the sclera, fully exposing the muscle.

The inferior oblique is grasped with special muscle forceps[2] at a distance from its attachment equal to the amount of resection desired. Two double-armed sutures are introduced from the conjunctival surface of the muscle and passed through the special grooves of the forceps (Fig. 6).

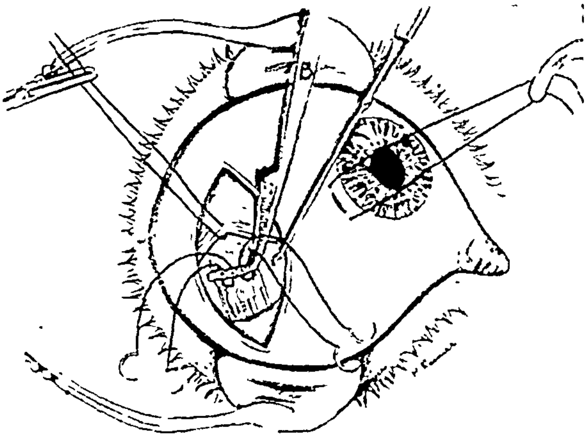

Fig. 6. Resection of the inferior oblique muscle at its scleral attachment. The lateral rectus is retracted upward; the eyeball is immobilized with a bipronged scleral hook. A special muscle forceps is placed on the muscle at a distance from the attachment equal to the resection desired. Two double armed sutures are inserted.

The portion of the inferior oblique between the scleral attachment and the muscle forceps is resected. While the special muscle forceps are still in place, the four needles of the double-armed sutures are passed through the remaining stump at the anatomical insertion of the muscle (Fig. 7). The muscle forceps are removed.

The sutures are tied securely and cut (Fig 7, insert) The conjunctival incision is closed with a continuous suture

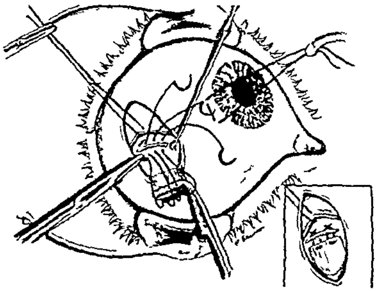

Fig 7 Resection of the inferior oblique muscle at its scleral attachment The inferior oblique muscle has been resected between the muscle forceps and the scleral attachment The sutures are inserted through the stump of the anatomical insertion *In insert* The sutures are tied

(2) *Tucking of the Inferior Oblique Near the Scleral Attachment*[20]

With blunt scissors a curved incision is made in the conjunctiva below the border of the lateral rectus, which is drawn upward, exposing the inferior oblique A strabismus hook is inserted under the muscle As the hook is pulled away from the globe it raises a fold, through which one or two double *armed sutures are inserted (Fig 8) to secure* union between the opposed flat surfaces of the tendon The height of the fold above the suture determines the amount of actual shortening produced The sutures are tied securely The conjunctival wound is closed with a continuous *plain catgut suture*

(3) *Advancement of the Inferior Oblique at the Orbital Rim*[17]

*A cutaneous incision is made along the in*ferior orbital rim, so situated that its central point is in the same vertical sagittal plane as the pulley of the superior oblique muscle The fibers of the orbicularis are separated by blunt dissection The orbital septum is then incised

A strabismus hook, introduced at the temporal end of the incision, engages the inferior oblique muscle which is brought out into the wound The dissection is also carried downward for exposure of the periosteum 10 mm or more below the orbital margin (Fig 9)

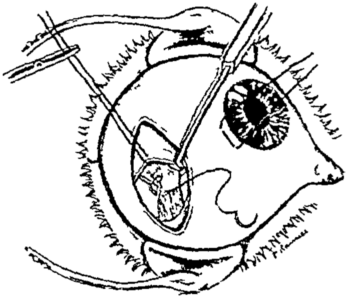

Fig 8 Tucking of the inferior oblique muscle near its scleral attachment The lateral rectus is drawn upward to expose the attachment of the inferior oblique A strabismus hook is introduced under the muscle, lifting a fold, through which the sutures are placed

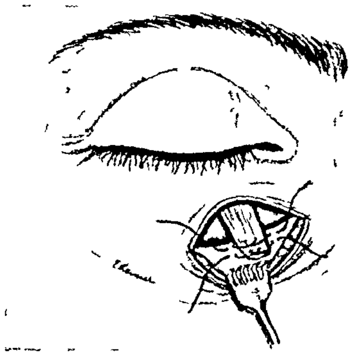

Fig 9 Advancement of the inferior oblique muscle at the orbital rim Through the cutaneous incision at the orbital rim, the inferior oblique is charged on a strabismus hook

Two chromic catgut sutures are passed through the tendon near its attachment, while the muscle is stretched on a strabismus hook. The inferior oblique is cut free from its attachment. It is advanced as much as is necessary and secured to the periosteum anterior to the rim on the facial surface of the superior maxilla by means of the chromic sutures prior to the division (Fig. 10).

The orbital septum opening is closed with plain catgut sutures and the skin wound with a subcuticular silk suture.

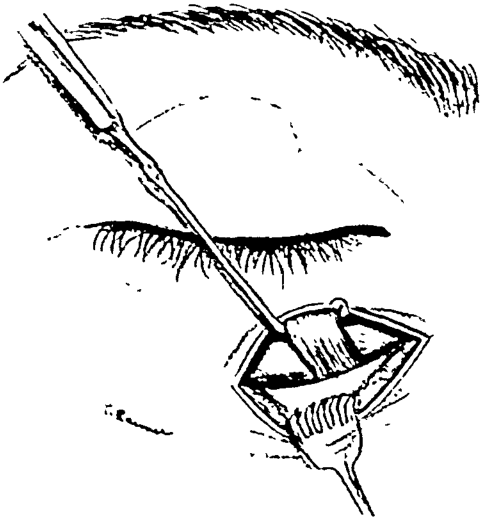

Fig. 10. Advancement of the inferior oblique muscle at the orbital rim. The severed inferior oblique is advanced as needed and secured to the periosteum of the facial surface of the superior maxilla by means of sutures.

C. *Transplantation of the Inferior Oblique Muscle*[23]

A curved incision is made in the conjunctiva with blunt scissors, extending from above the lateral rectus to a point deep in the lower cul-de-sac over the inferior rectus. Tenon's capsule is grasped lateral to the border of the inferior rectus and a strabismus hook is introduced under the muscle.

Tenon's capsule is also entered at the lower border of the lateral rectus. The muscle is then retracted upward, exposing the attachment of the inferior oblique.

The special muscle forceps are placed approximately 12 mm. from the orbital attachment. The muscle is severed from the scleral insertion and the excess of muscle distal to the forceps is resected. Two double-armed chromic catgut sutures are inserted through the guides in the special forceps. The loose muscle is pulled medially into the conjunctival wound.

The needles are then introduced in the episcleral tissue nasal to the attachment of the inferior rectus, approximately 3 mm. from the limbus. The sutures are tied securely and cut close to the knots (Fig. 11). The conjunctiva is then closed with a continuous suture.

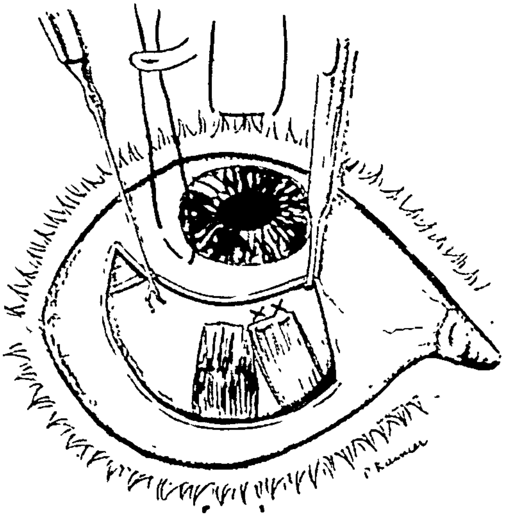

Fig. 11. Transplantation of the inferior oblique muscle to act as a depressor. Through a wide inferior conjunctival incision, the inferior oblique severed from its attachment to the sclera, under the lateral rectus is brought medially and sutured near the limbus along the paralyzed medial rectus.

DISCUSSION

Thirty-eight operations on the inferior oblique muscle have been performed on 31 patients. They are grouped as follows:

Lengthening operations:

Simple recession at the scleral attachment	15	29
Bilateral recession at the scleral attachment	4	
Simple graduated myotomy near the scleral attachment	2	
Bilateral graduated myotomy near the scleral attachment	1	
Myectomy near the orbital attachment	2	

Shortening operations

Simple resection at the scleral attachment	5	9
Tucking near the scleral attachment	4	

The author's preference for an approach to the inferior oblique at its scleral attachment over that at its orbital attachment is clearly indicated in these cases by the ratio of 36 to 2 in favor of the scleral approach The latter permits the detailed study of the insertion and the technic to be modified according to the individual case The same conjunctival incision may be used, when associated operations are necessary and may be undertaken at the same time as the inferior oblique displacement

It seems desirable to sever the muscle as close to the attachment as possible, this eliminates the possibility of disturbing the innervation, which enters the muscle from its posterior edge just after it passes the inferior rectus at the ligament of Lockwood

The effects of a myectomy of the inferior oblique orbital attachment have been variously reported The author's findings are more in line with those of Berens,[4] who claimed 5 3 prism diopters of correction in the primary position at 6 meters and 7 7 prism diopters at 25 cm, reaching 11 prism diopters in the field of vertical action of the muscle The myectomies reported here resulted in a correction of 6 prism diopters of hypertropia in the primary position of the eyes When extremely small hypertropic corrections are necessary, myotomy or myectomy in the sheath of the inferior oblique muscle[12] appears especially indicated

The literature contains little information on the results obtained from a measured displacement of the scleral insertion of the muscle In this series, a 1 mm recession of the muscle did not give a uniform hypertropic correction of approximately 1 prism diopter, but varied with the total amount of the attempted recession In recessions of small amounts, the findings parallel those of Berens,[4] that is, 1 mm of retroplacement gives a 1 prism diopter correction of hypertropia in the primary position of the eyes, but as the amount of recession increases this relationship alters In recessions of from 6 to 7 mm, the average result obtained varied between 10 and 13 prism diopters of hypertropic correction or from 1 4 to 2 prism diopters per millimeter of retroplacement In the group of 10 mm recessions, the results varied between 1 5 to slightly over 2 prism diopters per millimeter of displacement It can be said, therefore, that when the opposing vertical muscles to the recessed inferior oblique are normal clinically, in the small amounts of recession the relation is 1 mm for every 1 prism diopter, increasing to 2 prism diopters for each millimeter in the larger recessions The results can be seen in the accompanying table

Relationship between the Recessions in Millimeters of the Inferior Oblique on the Sclera and the Correction of Hypertropia in the Primary Position

Recession in mm on sclera	3	4	5	6	7	8	9	10
Correction of hypertropia in prism diopters	3	4 8	6 5	8 3	12	14	17	20

In resections of the inferior oblique muscle, the effect of every millimeter of displacement appears slightly larger than for the small amounts of recessions and approximately the same in the large amounts It can be said, as a rule, that 1 mm of resection will correct 1 5 prism diopters of hypotropia For tuckings the result is definitely a great deal smaller, usually 0 7 prism diopters per millimeter of tuck which explains why this operation was discarded even by some of its earlier advocates

A study of these cases indicates that combining the vertical and horizontal correction made the latter less extensive in the amount of resection and recession than it would have been without the neutralization of the hypertropia This finding has been recognized at an early stage in many cases, and the suggestion has been made that often the vertical component is the prime factor in the strabismus

The relatively insignificant number of cases of postoperative cyclophoria or cyclotropia may be explained by the fact that the torsional component of the inferior oblique action is kept relatively the same by the action of the so-called check ligament of the muscle, which is not modified by the operation.

SUMMARY

The inferior oblique is accessible not only to recessions but also to resections, tucking and even transplantation of muscle fibers for muscle paralysis.

Surgery should be done at the insertion of the inferior oblique rather than at its origin because of its easy approach and the nature of the anatomy. Fusion of the fascial sheaths of the inferior rectus and inferior oblique at the tendon of Lockwood, even though not intimate, may nullify to a variable degree the operative results if the operation is done at the bony origin.

Weakening of the inferior oblique action is recommended in the contralateral eye when there is a paresis of a superior rectus muscle and fixation with the paretic eye. It is also advisable in secondary spasm resulting from a paresis of the superior oblique of the same eye; in primary overaction of the inferior oblique muscle, combined with an upshoot of the adducted eye, and destroying comitance in fields of oblique gaze; and finally, in fibrosis of the lateral rectus with compensatory spasm of the inferior oblique of the same eye.

Strengthening the action of the inferior oblique is indicated in paresis of the muscle, especially when associated with pseudoptosis of the affected eye. The paresis of the inferior oblique may be congenital, often associated with a weakness of the homolateral superior rectus, or acquired, following excessive myectomy or recession of the muscle.

The results obtained from calibrated recessions and resections are somewhat different from published accounts. To equal increments of the displacement on the sclera correspond approximately constant increments in hypertropic correction.

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Suppuration: A Rare Complication After Goiter Excision

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ALTHOUGH there are many postoperative complications resulting from excision of a goiter (such as tetanus, bleeding or injury to the recurrent nerve), suppuration represents a comparatively slight danger. In most cases suppuration appears about the ligature or about the sutures placed in the platysma, sternohyoid or sternothyroid muscles. However, there are cases in which it begins deeper and thus threatens the life of the patient. In such cases it frequently involves the deep cervical fascia and also the bodies of the cervical vertebrae. An accurate diagnosis is of paramount importance, for the fate of the patient depends upon it Fever and leukocytosis may suggest that suppuration exists, but they tell nothing about its site and extent.

CASE REPORTS

Case 1: A woman, aged 20, was operated on for goiter. On the sixth postoperative day, fever developed; it continued for four days. The leukocyte count was 12,000. There were pains radiating to the right arm, a stiff neck and a tilted cervical column.

The wound was exposed with the patient under intravenous anesthesia. Severing of the platysma, sternohyoid and sternothyroid muscles followed. The sternocleidomastoid having been retracted laterally, and the stump of the goiter and the gullet medially, the deep cervical fascia appeared (Fig. 1). There was an area of suppuration measuring 3.2 cm. at the level of the fifth and sixth cervical vertebrae. After the necrotic fascia had been removed, it was observed that the process had involved the bodies of the two vertebrae mentioned. The diseased bone was curetted and tamponed, after which penicillin was locally administered. Complete recovery resulted in two weeks.

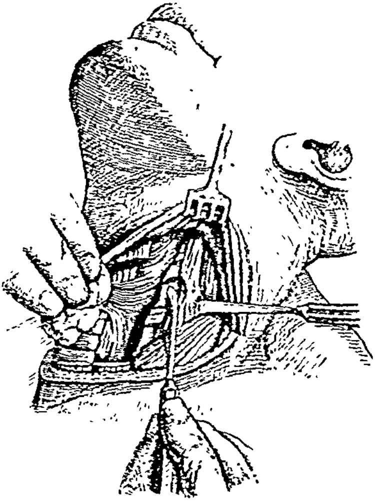

Fig. 1. Exposure of deep cervical fascia by retraction.

Case 2: A man, aged 55, was operated on for retrosternal goiter causing tracheal compression. During the operation it was necessary to perform tracheotomy because of the collapse of the air pipe. In spite of treatment with penicillin (400,000 O. U.), fever developed on the tenth day and the patient had a rigid neck. Permission for a second operation was refused. The general condition became worse; there was much sputum, suggesting a pulmonary abscess. Penicillin was employed again, with no result. On the thirty-fourth postoperative day the patient died. Necropsy revealed a suppurative process resembling that in Case 1, besides a perforation into the gullet through an opening 1.5x1.0 cm. (Fig. 2).

SUMMARY

Ten days after a goiter operation, if the patient develops a fever, a stiff neck, pains radiating to the arms (due to a collateral edema around the intervertebral foramen)

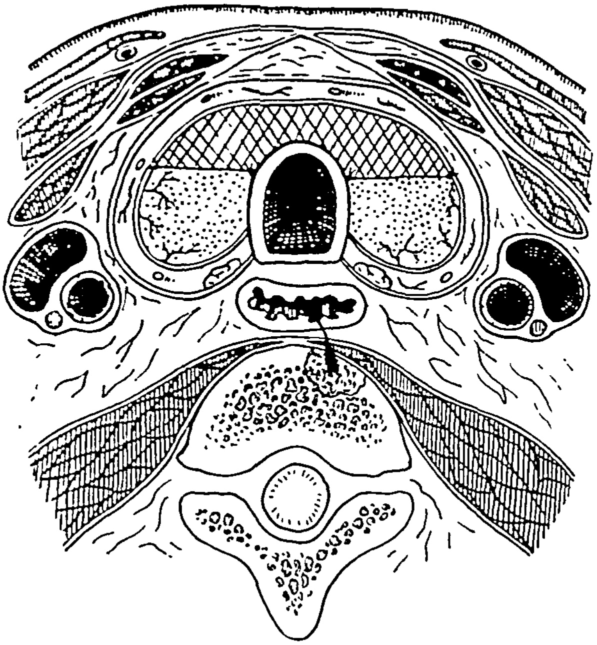

Fig. 2. Perforation into the gullet revealed at necropsy (Case 2).

necrosis of the deep cervical fascia and osteomyelitis of the vertebra should be suspected.

In daylight, an anteroposterior film yields much information. The laterolateral film may show decay of the bone structure, pointing to osteomyelitis. In this condition the hazard of operation is negligible as compared to that of delay, which may be fatal, causing perforation into the esophagus, mediastinitis and sepsis. Early excision of necrotic fascia and diseased bone is likely to result in complete recovery.

RIASSUNTO

Bisogna sospettare una necrosi della fascia cervicale profonda ed un'osteomielite delle vertebre ogni qualvolta un operato di gozzo presenta--10 giorni dopo l'operazione—febbre, rigidita' del collo, dolori irradianti verso le braccia (per edema collaterale intorno i fori intervertebrali). Radiografie prese in senso antero-posteriore facilitano molto la diagnosi quelle in senso laterale permettono talvolta di rilevare un'osteomielite delle vertebre. Se questa complicazione si manifesta, il pericolo di un nuovo intervento operatorio e' trascurabile di fronte all'eventualita' di una perforazione nell' esofago, mediastinite e sepsi. Una completa guarigione puo' essere ancora ottenuta mediante l'escisione della fascia necrotica e delle parti ossee ammalate.

SUMARIO

Si el paciente presenta diez dias despues de una tiroidectomia sintomas de fiebre, rigidez del cuello, y dolores radiculares braquiales (debidos al edema colateral de los agujeros intervertebrales) el cirujano debe de sospechar la necrosis de la aponeurosis cervical profunda con osteomielitis vertebral. En el diala radiografia es de gran valor diagnostico la vista latero-lateral puede mostrar la necrosis vertebral indicativa dela osteomielitis. El diagnostico a tiempo disminuye los peligros de la intervencion quirurjica, mientras que el retardo puede ser fatal, por las complicaciones que este acarrea, tal como la perforacion del esofago. la mediastinitis, y la septicemia. La excision temprana del tejido necrotico del hueso afectado muy posiblemente resulta en la mejoria completa.

SOMMAIRE

Si dix jours après l'opération d'un goître, le malade présénte de la fiévre, de la rigidité du cou, des douleurs radiantes dans les bras (dûes à un oedéme collatéral autour du trou intervertébral), il faut songer à la nécrose du fascia cervical profond et à l'ostomyelite de la vertèbre. Un film antéro-posterieur donne beaucoup de renseignements. Un film latérolatéral montrera l'état de l'os, l'ostéomyelite, la nécrose. En présence de cette complication, les hasards de l'opération sont negligeables comparés au delai qui peut entraîner une perforation dans l'oesophage, une mediastinite, une infection généralisée. Une incision précoce du fascia nécrotique et de l'os malade peut donner comme résultat, le rétablissement complet.

An Operation for Primary Glaucoma: Goniodialysis Combined with Sclerectomy and Iris Inclusion

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IN THE treatment of primary glaucoma, most eye surgeons have done some part of the goniodialysis operation combined with sclerectomy and iris inclusion, many times—the sclerectomy, the iris inclusion or the goniodialysis. My suggestion is that all these procedures be done at one time and that the incision be made *ab externo* as originally advocated by Ernst Fuchs.

The operation is indicated in cases of chronic primary glaucoma either with or without acute exacerbations. It can also be used in cases of intractable borderline secondary glaucoma, that is in the treatment of conditions difficult to classify as true primary glaucoma. Often, in such cases, more than one operation has been done with no permanent control of tension.

This triple operation has been done at Mt. Sinai hospital and at the Manhattan Eye, Ear and Throat hospital, New York City, in 43 cases. Of these patients, 20 were male and 23 were female. Their ages ranged from 43 to 79. The preoperative duration of the glaucoma varied from one year to at least eight years. The tension before operation, with miotics, varied from 30 to 80 (Schiotz).

The visual fields varied from almost normal to telescopic with paracentral scotomas of varying size and enlarged blind spots extending almost to fixation. In no case was the field narrowed or the visual acuity impaired by the operation. None of the patients showed lenticular opacities as a result of the operation. Visual acuity before operation ranged from 5/400 to 20/20.

Some cases have been followed for three years, others for only one month. Three patients who had previously undergone operations for relief of tension were operated on by the method described in this paper. Of these three operations, only one was a failure after eight months. If a patient [illegible] 1 operative miotics more than th [illegible] to keep the tension normal, the operation was considered a failure.)

The operation that failed was performed on a Negro who had syphilis and whose right eye was lost after several unsuccessful operations, including cyclodiathermy, to control the tension. The left eye had undergone one operation for glaucoma, with no reduction in tension. Then the operation described here was performed by the surgeon in charge. The tension was controlled for eight months but rose again and could not be controlled with miotics.

TECHNIC

The operative procedure is simple and requires no great amount of surgical skill. It can be done with either intravenous or local anesthesia. On the day of the operation I use no miotics; this makes it easier to withdraw the iris from the wound. When local anesthesia is employed I use a lid block according to Van Lint's technic and two sutures through the upper lid and one through the superior rectus. No suture is needed for the lower lid. Two cc. of 2 per cent novocain with adrenalin is injected retrobulbarly above and also some subconjunctivally above, ballooning up the conjunctiva between the limbus and the upper fornix.

The incision is made 1 cm. above the limbus and rather wide, as for trephining. Tenon's is also opened rather wide. As one approaches to within 5 mm. of the limbus (Fig. 1), the incision goes through all the layers down to the sclera. This incision must be made wide enough to avoid a small filtration area, which would stand out like a knuckle.

The dissection is carried down to the corneoscleral margin (Fig. 2), and here a partial splitting of the cornea, as for a trephine, may be performed, though it need not be carried into co[illegible]l tissue for any considerable distance [illegible] ratome [illegible] ite, a 5 mm

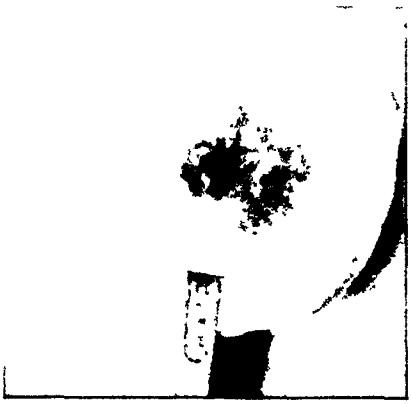

Fig. 1.

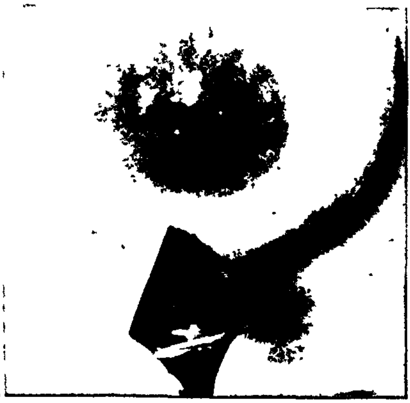

Fig. 2.

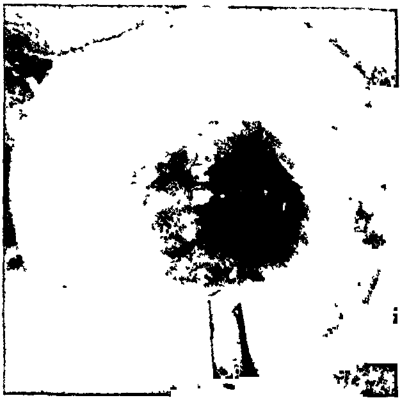

Fig. 3.

Fig. 1. When the limbus is reached, the final dissection is completed with a Tooke knife so as to expose clearly the corneoscleral margin.

Fig. 2. The *ab externo* scleral incision is made 5 mm. long, with the point of a keratome 2 mm. above the corneoscleral margin until the uveal tissue is reached.

Fig. 3. An iris repositor is then placed in the wound, hugging the inner scleral surface, and gently advanced until the repositor enters the anterior chamber. The repositor is then moved from side to side, freeing the angle (goniodialysis).

incision is made through the sclera 2 mm. above the corneoscleral margin. This line is scratched deeper and deeper until the uveal tissue is reached. If scleral bleeding is annoying, it is easily controlled by applying thrombin topical on an applicator. Then an iris repositor is inserted through the wound, hugging the under surface of the sclera (Fig. 3).

If the repositor does not enter easily, the incision with the keratome is repeated, going a bit deeper this time. The repositor is tried again, and as it enters it is placed gently into the anterior chamber, entering through the iris angle. The repositor is swung gently from side to side, opening the angle over as great an area as possible.

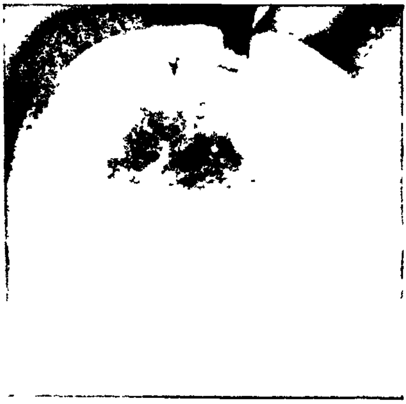

Fig. 4.

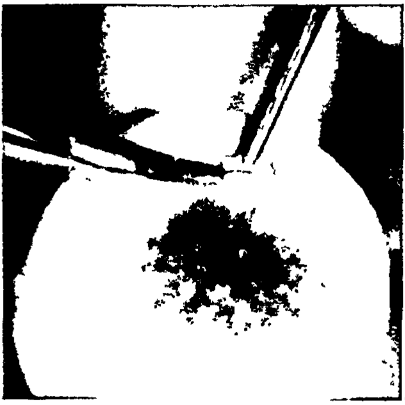

Fig. 5.

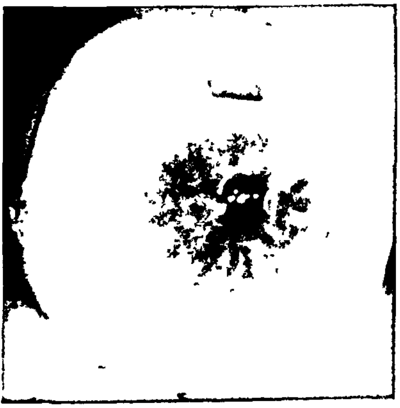

Fig. 6.

Fig. 4. Two incisions 3 mm. apart are then made in the sclera towards the corneoscleral margin for a distance of 1 mm.

Fig. 5. The piece of sclera is cut off with scissors to make a scleral opening measuring 3 x 1 mm.

Fig. 6. [illegible] 2 x 3 mm. has been excised. This has been made extra large for purposes of demonstration but in actual practice does not exceed 1 x 3 mm.

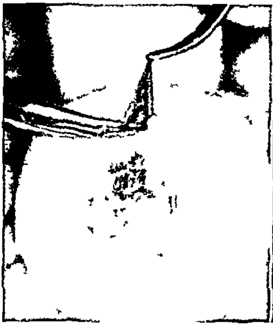

Fig 7

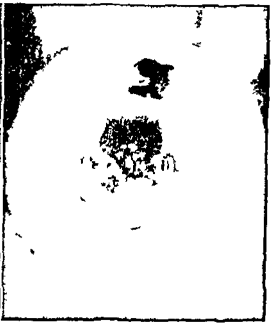

Fig 8

Fig 7 The iris is withdrawn until the black pupillary seam is seen, then it is cut halfway across

Fig 8 The iris, which is in the forceps, is allowed to lie on the sclera as it falls No attempt is made to turn the pigment surface up or face down

With a Stevens scissors two incisions are made 3 mm apart (Fig 4) at right angles to the original scleral incision going down to the corneoscleral margin This piece of sclera is picked up in toothed forceps and excised (Figs 5 and 6) The iris is then gently grasped with iris forceps near the pupillary margin and, with a gentle side to side swaying motion, is carefully and slowly withdrawn through the scleral wound until the black pupillary portion is visible (Fig 7)

One incision is made through half of the withdrawn iris to the pupil, and this pillar is allowed to recede The other portion of the iris, which is still in the iris forceps, is allowed to lie on the sclera just as it falls (Fig 8) *No attempt is made to straighten the iris* or to place the pigmented layer of the iris against the sclera The conjunctiva is now closed with a running silk suture, a knot being tied at both ends and the bites taken *rather close together In this way a tight* closure is obtained and the ends of the suture can be cut short One drop of 1 percent atropine is instilled and then the eye is bandaged

COMMENT AND SUMMARY

I was curious to know what structures my iris repositor traversed as it passed from the scleral incision 2 mm above the corneoscleral margin into the anterior chamber I obtained a normal globe from the Eye Bank made the scleral incision and inserted a piece of black

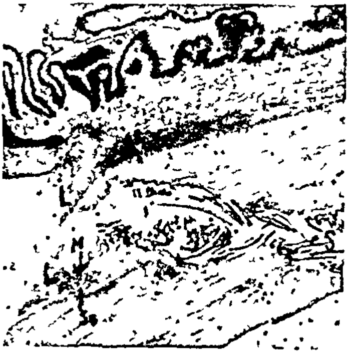

Fig 9 *Section of eye fixed in Bouin's solution* and stained with hematoxylin eosin (S) Site of incision (L) Ligamentum pectinatum (M) Scleral meshwork (Sc) Schlemm's canal

silk suture material along the path of the repositor. The eye was fixed in Bouin's solution, sectioned and stained with hematoxylin-eosin. Figure 9 shows the site of the scleral *ab externo* incision, the suture material entering and passing between the sclera and the ciliary muscle through the ligamentum pectinatum.

Therefore, the goniodialysis succeeds in cutting the trabeculae and freeing any anterior *peripheral synechiae that may* be present. A filtration tract is thereby formed, connecting the anterior chamber through the angle with the outer surface of the globe. This tract is kept patent by the inclusion of iris tissue in the entire length of the channel. The length of the tract is cut in half by removing a 1 mm. piece of sclera, thus bringing the opening in the sclera directly over the filtration angle. Furthermore, when the iris is withdrawn and cut *after* the sclerectomy, the cut is made directly at its root.

It is of interest to note that an article recently appearing in the Brazilian ophthalmic literature reports an operation of simple goniodialysis executed exactly as I have described it, without sclerectomy and without iris inclusion. The author of the article performed the goniodialysis on four patients, in two of whom the tension was satisfactorily controlled.

RIASSUNTO

La goniodialisi riesce a tagliare le trabecole, liberando ogni possibile sinechia anteriore e periferica. Viene così a crearsi un canalicolo di filtrazione, che connette la camera anteriore con la superfice esterna del globo. Questo canalicolo viene mantenuto pervio mediante un'incisione dell'iride lungo l'intiera lunghezza del canalicolo. Il tragitto viene poi diviso in due, asportando un tratto di 1 mm. di sclera, portando così l'apertura nella sclera direttamente sopra l'angolo di filtrazione. Per di piu', allorquando l'iride viene ritirato e tagliato dopo la sclerectomia, il taglio viene portato direttamente alle sue radici.

L'A. richiama l'attenzione sopra il fatto che nella letteratura brasiliana e' stata riportata di recente un'operazione di goniodialisi simile a quella descritta la Laval, ma senza sclerectomia e senza l'inclusione dell'iride. Sopra 4 pazienti sottoposti a questo genere d'operazione, in 2 l'intervento ha consentito un controllo soddisfacente della tensione.

SUMARIO

Hemos encotrado que la genio-dialisis sucede en cortar las trabeculas y en liberar las sinequias anteriores perifericas que puedan existir. Asi tambien se forma un tracto de filtracion conectando la camara anterior con la superficie exterior del globo ocular. Este tracto se mantiene patente por la incision del tejido del iris en toda la extension del canal. Al removerse un milimetro de la esclera se corta en la mitad la longitud del canal en forma tal que la apertura de este viene a estar directamente sobre el angulo de filtracion. Aun mas cuando el iris es cortado despues de haberse practicado la esclerectomia este corte se puede hacer directamente en su raiz.

Notamos con interes un articulo que aparecio recientemente en la literatura brasilena en que se reporta una operacion de geniodialisis simple tal como la que yo he descrito pero sin esclerectomia e inclusion iridica. El autor de ese articulo practico su operacion cuarto pacientes, en dos de los cuales la tension fue controlada satisfactoriamente.

SOMMAIRE

La gonodialyse a réussi à couper les trabécules et à libérer toute adhérence périphérique antérieure. Un conduit de filtration est ainsi formé joignant la chambre intérieure à travers l'angle avec la surface extérieure du globe. Ce conduit est maintenu ouvert par l'incision de l'iris dans toute la longueur du canal. On resèque un mm. de la sclérotique au-dessus de l'angle de filtration. Ainsi, quand l'iris est enlevé et coupe après le sclérectomie, l'ouverture est faite directement à cette racine.

Il est intéressant de remarquer un article récement publié dans une revue ophthalmique. brésilienne decrivant une opération semblable à celle décrite sans sclérectomie et sans inclusion de l'iris. L'auteur de l'article opéra 4 malades. Dans deux cas, la tension fut controlée avec satisfaction.

Surgical Treatment of Scrotal Elephantiasis in West Africa

ROLAND PONS, M D , AND
RADUMIR ILIESCU CONSTANTINE M D , M I C S
ALGIERS, WEST AFRICA

AMONG the different forms of elephantiasis, the penile scrotal type is most frequently found in West Africa It affects both the penis (penile teguments) and the scrotum, or the scrotum alone

The weight attained by the elephantiasic tumor ranges from 5 to 16 Kg Most of the patients are natives, no case has been reported in which the patient was a European The condition occurs most frequently among the bushmen, natives living in isolated communities in the bushlands of French Guinea, the Lower Sudan and the Upper Ivory Coast

Macroscopically the lesion appears as a hard, toughened mass of tissues, which if it affects the lower limbs is adherent to the muscles Scrotal elephantiasis appears as a hard stony bulge

The penis, when its tegumental layers are involved, appears hypertrophied, only the outer tissues (epidermis and dermis) being affected In the cases observed by us, as in the majority of cases of scrotal elephantiasis sectioning of the tissues revealed a firm tough textured white mass infiltrating the dermis and hard to the cutting scalpel The epidermis showed a diffuse keratitis is thickened and is covered with lumps and crosses The microscopic picture as observed in our two cases was that of a chronic diffuse dermatitis associated with a lardaceous degeneration of the connective vascular and glandular (sebaceous and sweat gland) elements of the dermis Keratosis of the epidermis is more marked in cases of scrotal elephantiasis

The chronic inflammation occurring in the dermis is due exclusively to a streptococcic infection The dermatitis develops gradually constantly spreading and finally leading to the tissue degeneration just described

In our operative case the chronic elephantiasic inflammatory process affected a number of anatomic structures In the scrotum the epidermis and the dermis with the dermic elastic fibers, were affected, also the subcutaneous cellular tissue and the dartos, with the skin lining muscle, its longitudinal fibers and the adjoining elastic fibers

The cellular connective tissue layer between the dartos and the cremaster muscle was also affected by the elephantiasic infiltration The tunica erythroida (erythyroid muscular lining membrane) was not affected, nor were the tunica fibrosa and the tunica vaginalis, peritesticular lining membranes The testes themselves, including the testicular fibrous membrane, the albuginea, were free from elephantiasic changes

TECHNIC

1 Apply a hemostat (rubber tube appliance) at the root of the scrotum and outer urethral tract

2 Cut from the tegumental surface the flap intended to become the wrapping of the penis (gubernaculum)

3 Search for the penis, sunk in the elephantiasic mass Disentangle it and lift it, together with the flap, onto the outer abdominal wall

4 Hemisect the tumor

5 In each half of the tumor, search for the testis Disentangle the testis and the inguinotesticular tract from the surrounding mass of elephantiasic tissue

6 Dissect out the lateral flaps which will become the scrotal coating (new plastic scrotum) The size of these flaps depends on the bulk and volume of the testes Each flap contains, in addition to the outer cutaneous layers (epidermis stratum lucidum, Malpighi's layer, dermis) a lining layer of elephantiasic tissue three to four mm thick This material, because of its hypervascularized structure—it contains a large network of dermic (chorionic) blood vessels—is an important factor in the grafting process aiding in reepithelization and healing of the operative wound

7. Lay aside the three flaps and, with the penis and the testes lifted onto the abdomen, perform a deep resection (exeresis) of the two tumor masses.

8. Attend to hemostasis of the blood vessels in the operative field, with gradual and careful slackening and final removal of the hemostat.

9. Suture the flaps, starting at the posterior end of the incision line back to front, by means of Michel's clips.

10. Around the top of the prepuce add a crowning suture of catgut (stitches at uniform intervals). Apply a vaseline-dabbed collarlike gauze dressing to prevent the trickling of urine onto the incision line.

Draining by means of a drainage tube is considered only if hemostasis in the operative field has not been perfectly carried out. Frequently, widespread bleeding on the incision surface occurs when ligation is hampered by slippery, elephantiasic tissues adhering to the tunicae of the blood vessels that require ligation.

SUMMARY

The clinical appearance, pathologic picture and surgical treatment of elephantiasis, especially of the scrotum and the penis, are discussed, with details of surgical technic as worked out by the author's service in West Africa.

RIASSUNTO

Descrive l'aspetto clinico, il quadro patologica e la cura chirurgica dell'elefantiasi, specialmente dello scroto e del pene. I dettagli della tecnica chirurgica sono derivati dall' esperienza acquisita dall'A. nella sua permanenza nell'Africa Orientale.

SUMARIO

El autor discute la patologia, sintomatologia, diagnostico y tratamiento quirurjico de la elefantiasis tropical y presenta su tecnica operatoria, que el desarroyo durante su servicio militar en el occidente de africa.

SOMMAIRE

L'apparence clinique, l'image pathologique et le traitement chirurgical de l'éléphantiasis, surtout du scrotum et du pénis sont discutés en détails ainsi que la technique chirurgicale élaborée et employée par l'auteur quand il était en service en l'Afrique Occidentale.

A New Method of Portable Skeletal Traction for Compound Fracture of the Humerus*

BOYAN HADJISTAMOFF, M.D.
SOFIA, BULGARIA

THE Italian scientist Codevilla (1903)[15, 16, 17, 18, 19, 20] originated skeletal traction. Driving a pin through the calcaneus, he stretched the limb and applied plaster to keep it in traction. For his times Codevilla achieved amazing results with this type of treatment. He treated successfully coxa vara with osteotomy and skeletal traction and also corrected shortenings of the leg up to 6 cm. resulting from malunited fractures. Later Steinmann (1907)[58] recommended permanent skeletal traction with a pin, applying no plaster bandages. This modified method of traction had even greater possibilities for functional treatment of fractures.

Skeletal traction underwent important technical improvements in later years. Klapp (1912)[43] introduced skeletal traction with soft wire ("Drahtextension"), Herzberg (1918)[35, 36] invented the bow to hold taut the wire, and Kirschner (1927)[42] used the bore wire ("Bohrdraht") which was passed through the bone either by hand or by an electrically driven instrument and remained there, serving as a traction.

In accordance with the aforementioned achievements with skeletal traction and traction of the humerus applied at first by means of a pin (Codevilla Steinmann) followed by a soft wire (Klapp) and since 1927 Kirschner wire has been mainly used. The proposal of Florschutz[25] and, later, that of Boever[10] to pass a metal screw into the ulna or the olecranon did not attain popularity. In the long list of authors who merit popularization for analysis of the indications and technical improvement of humeral skeletal traction, the following scientists should be mentioned: Florschutz,[25] Henes,[37] Ansinn,[1, 2, 3] Steinmann,[58, 59, 60] Block,[8] Stahnke,[56, 57] Baumann,[4, 5, 6] Groves,[30] Kappis,[33, 40] Klapp u. Block,[44] Hoke Thornton,[61] Putti,[53] Johner,[38] Domrich,[22] Gilcreest,[28] Faltin,[23] Boever,[10] Boemninghaus,[9] Folsch,[26] Valls Girardi,[62] Leveuf Girode Monod,[48] Zachumenszky,[64] Patterson,[51] Deuticke,[21] Okamura,[50] Caldwell Smith,[12] Haggart Bailey,[34] Piotet,[52] Machado,[49] Kyrle Popovic,[4] Christie,[14] Kostler,[46] Godard,[29] Boitchev,[11] Key Conwell,[41] Pitts,[54] etc.

The Kirschner wire, with hardly any exception, today is used for skeletal traction of the humerus. It is most easily driven by means of an electromotor, a local anesthetic having been applied. The wire can be passed through the distal end of the humerus (diacondylar), through the olecranon or through the proximal end of the ulna. The diacondylar approach is considerably hindered by hematoma and swelling in the region of the elbow. Its application is also limited because of the danger associated with injury of the ulnar nerve. Traction through the olecranon is inconvenient because of the proximity of the elbow joint. Besides, the wire might easily cut the narrow stripe situated between the joint and the bursa olecrani. Therefore the most suitable spot remains the posterior edge of the ulna, under the elbow joint. It is easily reached and is thick enough not to be cut off by the wire during traction.

Infection of the wire track may be prevented by Beck's metallic pads and screws, which keep the wire in a fixed position and prevent its sliding down the bone canal.

Skeletal traction of the humerus may be applied in two ways:

1. By traction appliances fastened to the bed (Ansinn,[2] Baumann,[5] Klapp u. Block,[44] Putti,[53] Gilcreest,[28] Boemninghaus,[9] Patterson,[51] Caldwell Smith,[12] Haggart-Bailey,[34] Machado,[49] Christie,[14] Godard,[29] Key Conwell[41]).
2. By abduction splints and frames fastened to the thorax (Florschutz,[25] Henes,[37] Stahnke, Faltin,[23] Valls Girardi,[62] Zachumenszky,[64] [illegible] Popovic[4]).

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*From the Surgical Clinic, Sofia University, Sofia, Bulgaria.

I. Traction in bed can be applied by different positions of the arm: (1) abduction of the arm, usually at 90°, at a right angle and half pronation of the forearm; (2) vertical position of the arm obtained by suspending the forearm; or (3) traction by means of splints fastened to the arm, e.g., the modified Thomas splint, Block's[8, 11] traction apparatus, etc.

Traction of the humerus in bed is accompanied by *many inconveniences. First of all*, the patient has to be kept immobile in bed. This forced position is a torment to younger patients when no other heavy bodily injuries are present, and for older persons there is always the danger of hypostatic pneumonia and decubitus. The fractured bone is not fully immobilized, for the movements of body and limb affect the fragments of the fracture. Thus the fracture is deprived of the immobilization so necessary at the beginning for the complex biological process of union. The continuous displacement of fragments causes pain, nervousness, lack of sleep and loss of appetite, all of which prevent speedy repair of the fracture. Side displacements of the fragments are not rare. Gilcreest[25] and Köstler[46] try to immobilize the body with the help of plaster casts which are made for each patient separately, before applying the traction.

II. Skeletal traction of the humerus can be applied by means of splints and apparatuses fastened to the thorax. Thus the traction becomes portable and the patient is not forced to lie in bed. Every abduction splint can be adapted for this purpose. Christen[13] wooden abduction splint with a weight freely hanging (see Klapp and Block, page 238) gives the primary image of portable traction of the humerus. Abduction apparatuses made of light metal, which make possible all movements of the shoulder and elbow joints, represent a more perfect portable means of traction of arm. (Frank,[27] Woloschinow,[illegible] Borchard-Stahnke,[illegible, 57] König-Lamberger,[45] Godard[illegible] and others). One of the advantages of these abduction frames, as has been strongly emphasized, is avoidance of the fixing plaster cast (i.e., the spica humeri plaster cast) and the securing of mobility of the joints by easy changes in the position of the limb (i.e., major or minor abduction, anteposition, rotation of the arm). The frame is attached to the thorax by means of belts. Consequently, in contrast to the spica humeri plaster cast, it leaves body and limb free and revealed.

The weak point of every abduction frame, however, lies in the fact that its attachment to the body can never be perfect. The frame can move sideways and slide down, especially during the night's rest; thus the fragments are displaced and the fracture looses the necessary *immobilization. The mobility of the* frame and its daily replacement in the correct position makes treatment of the fracture painful and ineffective. The incomplete immobilization has especially harmful effects on compound and infected fractures of the humerus.

The abduction frame can naturally be attached to the thorax by means of a plaster bandage. This considerably increases its stability. Florschütz[25] and Henes[37] proceed in this way. They attach abduction frames previously prepared of wire splints (Cramer) to the thorax and connect the traction string (which is passing through a pulley) with a rubber tube fastened to the lower end of the frame. Some surgeons attach bow-like wire Cramer splints to a spica plaster around the elbow and tie the string of the skeletal traction apparatus to these. It is obvious that these wire splints and frames can not withstand the pulling and the skeletal traction can never be rightly adjusted. Hard and stable traction appliances should be attached to the plaster. For example, Hoke[61, 11] uses a metal bow provided with a special screw, which he incases along the arm. Thus a traction of definite force is possible. I supply the spica humeri plaster cast with a wooden or metal appliance for skeletal traction. It is attached to the lower part of the arm, so that the whole upper half of the plaster sleeve can be removed without affecting the traction or the full immobilization of the fracture. As will be shown later, by means of this device the skeletal traction can be precisely adjusted by means of a spring scale and a screw.

The indications for skeletal traction of the humerus are not exactly determined, nor are they clearly distinguished from those for other methods of treatment, i.e. indirect traction (adhesive strips), plaster of Paris bandages, etc Some authors apply skeletal traction only in extremely rare cases while others use it routinely for certain kinds of fractures of the humerus Skeletal traction is most often employed for fractures of the distal end of the humerus fractura supracondylica fracturae t v y extraemitatis inferioris humeri (Florschutz,[75] Henes[3] Kappis[4] Groves,[30] Baumann,[4, 5, 6] Putti[53] Boeminghaus[9] Folsch,[76] Patterson[1] Leveuf Girode Monod,[48] Deuticke,[21] Okamura[0] Protet Kyle Popovic,[4] Christie[14] Key Conwell[41]) A great many surgeons, however employ skeletal traction for fractures at the proximal end and the shaft of the humerus (Stahnke Ansinn[2, 3] Thornton Hoke[61] Dominich Gilcreest[8] Faltin,[73] Valls Guardi[6] Caldwell Smith[1] Haggart Bailey[34] Manchado[43] the author,[3] etc

In my opinion skeletal traction of the humerus should be applied as follows

1 For fractures of the distal end of the humerus when reduction by manipulation of the fragments followed by a plaster bandage proves unsuccessful In such cases, before operative treatment is undertaken skeletal traction of the proximal end of the ulna should be tried, for as a matter of fact such traction often gives excellent results in a few days—a good reduction, and retention of the right position of the fragments The operation that seemed unavoidable becomes unnecessary In such a case indirect traction with adhesive strips is ineffective because the distal fragments of the fracture are very short and reduction is accomplished only with difficulty

2 For highly displaced and badly comminuted fractures at the proximal end of the humerus when the necessity for strong skeletal traction appears Failure to reduce the fracture with indirect traction is often followed by a full success after Kirschner's wire has been applied

3 For oblique or comminuted fractures of the shaft when indirect traction cannot be applied because of eczema, dermatitis folliculitis, etc

4 For all displaced and inveterate fractures of the humerus, when the strong adherences allow reduction of the fragments only by means of very strong skeletal traction

5 For all compound and infected fractures of the humerus which are favorable to the application of skeletal traction Large wounds of the humerus make the use of indirect traction impossible Besides the copious secretion is apt to remove the adhesive strips On the other hand, the spica humeri plaster cast immobilizes the fracture but does not keep the fragments in the right position Soon after application of the plaster cast the size of the arm diminishes considerably as a result of the resorption of hematoma and the subsidence of the swelling The plaster cast becomes very loose, and the fracture is again displaced A second forced reduction, together with a change of the plaster cast, is however, absolutely not indicated Every disturbance of the immobilization of the limb, especially a rough reduction of the fragments, inflames the infection and causes a series of uncalled for and dangerous complications Therefore skeletal traction is most favorable for a successful treatment of such fractures of the humerus it reduces the fragments slowly and sparingly, it keeps them in the right position up to the day of their union, and it makes possible observation of the arm (gasoedem) and regular dressing of the wounds

It must be admitted that in spite of all the aforementioned merits, skeletal traction has failed to find a widespread application in the treatment of compound and infected fractures of the humerus, because it never secures the necessary immobilization of the limb I have underlined its principal defect, neither by traction in bed nor by traction with the abduction apparatus can the fracture be well immobilized, and it is well known that for compound and infected fractures the most important factor in success is full immobilization Indeed, this is the foundation on which every method of treatment should be based Imperfect immobilization of a compound fracture facilitates the spreading of infection in the bone and in the soft parts, thus prolonging the treatment It is of great importance, therefore, that skeletal traction of the humerus be combined with an immobilizing plaster of paris cast I have been doing this for some years by means of traction appliances attached to the spica humeri plaster cast

My method is based on the principle of the traction plaster cast (Codivilla, 1903)

I. Traction in bed can be a
ferent positions of the arm:
of the arm, usually at 90°, at
and half pronation of the for
tical position of the arm obtain
ing the forearm; or (3) tracti
splints fastened to the arm, e.g
Thomas splint, Block's[11] trac
etc.

Traction of the humerus in b
nied by many inconveniences
the patient has to be kept im
This forced position is a torm
patients when no other heavy
are present, and for older pe
always the danger of hypostat
and decubitus. The fractured bo
immobilized, for the movements
limb affect the fragments of the
the fracture is deprived of the i
so necessary at the beginning fo
biological process of union.
ous displacement of fragments
nervousness, lack of sleep and lo
all of which prevent speedy
fracture. Side displacements of
are not rare. Gilcreest[25] and K
immobilize the body with the
casts which are made for eacl
rately, before applying the tra

II. Skeletal traction of the h
applied by means of splints an
fastened to the thorax. Thus th
comes portable and the patien
to lie in bed. Every abduction
adapted for this purpose. Chris
abduction splint with a weight fi
(see Klapp and Block, page 23
primary image of portable trac
humerus. Abduction apparatuse
light metal, which make possible
ments of the shoulder and elbow
resent a more perfect portable mea
tion of arm. (Frank,[27] Woloschin
chard-Stahnke,[37] König-Lamberg
ard and others). One of the adva
these abduction frames, as has been
emphasized, is avoidance of the fixing
cast (i.e., the spica humeri plaster ca
the securing of mobility of the joints
changes in the position of the limb
major or minor abduction, antepositio

its proximal end a hollow stick points upward, with a metal ring around it, through which the traction string runs. The ring is fixed at the necessary height by means of a screw. From the middle of the tube a short metal stick 10 cm. long runs downward with a metal screw connected with the spring scale. By means of the traction screw the skeletal traction can be very precisely adjusted The force of the traction is usually 5 to 6 Kg.

What are the advantages of this portable traction plaster apparatus?

1. The spica humeri plaster cast and the skeletal traction secure full immobilization of the fracture. The fragments cannot be displaced even after dispersal of the hematoma and the swelling, since these are continually under the influence of the traction.

2. For inveterate infected fractures a slow and sparing reduction of the fragments can be accomplished by a gradually increasing skeletal traction continuing for some days Thus a good reduction of the fracture is achieved (which cannot be obtained by any other kind of treatment) without provoking the inflammation process. In such cases, in order that the forearm may be moved forward at the time of the traction, it should be left free from the very beginning by cutting the upper half of the plaster from the elbow to the fingers.

3. The traction is portable. The patient is not obliged to lie immobile in bed. If necessary, discharge from the hospital is easy and speedy.

4. If there is danger of gas edema, the whole upper half of the plaster sleeve can be temporarily removed. Thus the arm can always be observed without interfering with skeletal traction or immobilization of the fracture. When the danger is over the plaster cover can be fixed again in its place.

5. For compound fractures of the humerus it is quite easy to cut wide plaster windows on any side of the plaster sleeve so that the wounds can be treated and observed. The shovel of the metal traction apparatus takes little room and can be incorporated either backward to the armpit or forward to the elbow, according to the position of the wound.

6. In comminuted fractures of the shaft of the humerus, a luxuriant callus is never formed to compress and irritate the radial nerve, because the skeletal traction reduces the fragments in a correct position, while the spica humeri plaster cast removes the possibility of new dislocations, which often cause a surplus formation of callus. When the comminuted fracture is compound and infected, I increase the skeletal traction above the set standard (4 to 6 Kg) but only for the first few days. Then the fragments are set apart at a microscopic distance, and the pus pours out more easily (mechanical microdrainage). Thus a considerable hindrance, the result of dense and disorderly piling up of bone fragments, is removed The mechanical drainage lasts only for a few days, until the pus secre-

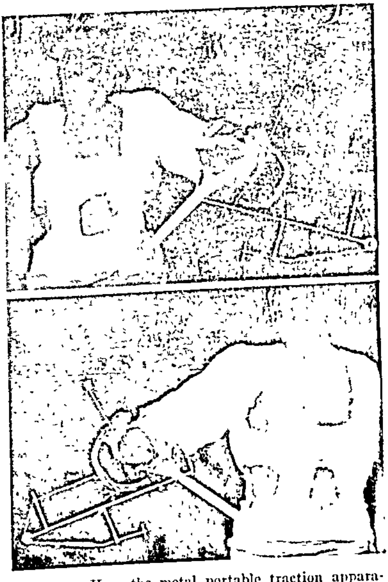

Fig. 4, 5. Here the metal portable traction apparatus is attached to the spica humeri plaster cast (made of six slabs, according to the author's method). It is light, cheap, and can b [illegible] The numerous plaster [illegible] and neatness of the bod [illegible] thorax possible. If necessary the windows can be broadened.

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Pituitary Transplantation from Cadaver in Treatment of Simmonds' Disease

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OF all the endocrine glands the pituitary is most closely correlated with the nervous system Numerous impulses are directed to the pituitary or proceed from it in the opposite direction The literature dealing with this problem is constantly furnishing new data, therefore a short summary of recent knowledge should be given The object of this paper is to present an operative procedure for pituitary transplantation which is apt to involve nerve fibers of secretory function at the implantation site

The new approach is based on the facts cited Its purpose is to implant the gland into an environment belonging to the same sympathetic segment Old methods dealing with implantation to the subcutis to the muscular layer of the abdomen or to the omentum have been discarded These methods may have been appropriate in the epoch heteroplastic transplantation, when the gland of a calf was used but for homoplastic transplantation of the gland of a cadaver a new biologic approach seems more promising

Experiments based on this idea have been done by J Szentagotai on rats These experiments have led to very interesting results

Free Homotransplantation of Rat Pituitary into the Cervical Musculature Near the transplant, the superior cervical sympathetic ganglion or its severed postganglionic fibers, having remained in contact with the ganglion was fixed

Result After a Fortnight At one place in the preparation a piece of the pituitary measuring 1 mm in diameter was seen Specific pituitary tissue was hardly visible Starting from the nerve stump numerous thin fibers of the sympathetic type entered the transplant, especially along the vessels

Thus, in a case in which the preganglionic fibers of the sympathetic ganglion were left intact, the postganglionic fibers entered the transplant (The preparations were impregnated by the method of Gross) These experiments supported my intention and induced me to perform the operation in such a way that the pituitary cut into lobules after its removal from the cranial base of a cadaver was implanted between the sympathetic fibers of the internal carotid artery

The fact that homotransplantation is the method most likely to result in success was first emphasized by Eiselsberg He was also the first to implant the epithelial bodies of a human being dead of an accident into a patient suffering with tetany (1908)

It is an ancient problem whether certain organs of persons dying suddenly may not be employed for transplantation on a wider scale It was necessary to keep this procedure within legal limits I therefore sought the agreement of legal authorities as to the conditions under which the operation was performed

The procedure is called a sterile dissection and takes place in two stages In the first stage performed by surgeons in the operating room the presence of a pathologist or a medicolegal expert is necessary in order that the status of the cranial cavity may be observed and described, thus the first stage of dissection takes place two hours after death in the operating room the second in the usual way in the dissection room Sterile dissection was performed only when it could be stated by the police that postmortem examination would be mandatory in any event The two hours elapsing between death and sterile dissection was enough for the arrival of the pathologist and for transportation of the patient from the ward One assistant removed the pituitary from the cadaver according to the usual technic of exposing the brain at dissection, while on the other operating table the carotid artery of the patient was liberated so that the gland might be implanted within a few minutes

Neither the cadaver nor the postmortem examination suffered any harm by this abbreviation of the legal interval (six hours) between death and dissection

The patients treated by pituitary transplantation form two groups. The first group, treated with the human gland only, contained one patient, a woman 41 years old. She had been examined by Prof. B. Horanyi. Three patients, a 17-year-old girl and two 19-year-old girls, had been examined by Dr. Petanyi, Dr. Volgyesi and Dr. Richter respectively. These patients, who formed the second group, had been treated previously by transplantation of calf pituitary as described by Kylin.

Without exception, all patients with Simmonds' disease had been observed and treated by skilled practitioners over a long period and were referred to us only after serious consideration. In each case we gave the parents all necessary information as to the operation and its occasional dangers. Each patient's address and telephone number were taken, so that they could be called when a suitable cadaver was immediately available. The patients were cooperative, awaiting our notice with interest.

In choosing a pituitary for transplantation, much care was taken. Eppinger's postulate that only a woman's gland should be implanted into a woman was carefully observed; also, as we were dealing with girls from 17 to 20 years of age, we made a point of securing, in each case, the pituitary of a dead woman of similar age.

Our hospital is situated in the center of the city and has the character of an emergency ward. About 20 patients per year, admitted for accidental injury, do not survive the day of admission. The moment a death occurred, one of our patients suffering from Simmonds' disease and corresponding in sex and age to the dead patient was called by telephone. In this way we performed a total of seven transplantations, four of which were done for Simmonds' disease.

The fact that primary healing of the cervical wound was observed in all cases is a proof that the pituitary gland was removed by a really sterile dissection. All patients were able to leave their beds by the third postoperative day.

Once more the question may be raised as to the advantage of implantation into the carotid sheath as compared with the old method of implantation into the abdominal subcutis or muscle. In considering this question, it must be remembered that the basic principles of the two operations are not the same. Implantation into the abdomen is directed toward securing an abundant blood supply for the transplant, whereas implantation into the carotid sheath aims at a proper site from the viewpoint of nerve supply. This site should be anatomically not far remote from the original site of the pituitary; therefore, since animal experiments have shown that the carotid sheath and the pituitary belong to the same sympathetic segment, there is a possibility that sympathetic fibers (occasionally secretory fibers) may grow into the substance of the transplanted gland.

All transplantation studies performed to date indicate that no transplant whatever can remain in the organism for a long time in a state of functional ability. Nevertheless, we hope that this method of homotransplantation will result in prolongation of the life of the transplant. This seems not unlikely, provided that, in addition to the abundant blood supply, the innervation of some pituitary lobules has been secured.

As to the final results of any treatment, the most objective criticism is that of time. Time will show whether transplantation of a human pituitary can yield a more valuable graft than the gland of a calf as suggested by Kylin, and whether implanting the gland into the carotid sheath can bring about more favorable conditions than are obtained by the abdominal subcutical transplantation.

SUMMARY

Pituitary transplantation can be performed in two hours after the donor's death without any difficulty. Wound healing has ensued in seven instances without any untoward events. All patients suffering from Simmonds' disease responded favorably to the operation. The increase of body weight, varying from 16 to 22 Kg., has lasted at least for three to seven years. For patients previously treated by Kylin's operation without success, the operation described in this paper has had good results.

Two patients after seven years and two patients after three years of observation are free of all symptoms, the increase in body weight ranging from 16 to 24 Kg. Two patients after 1½ years have died of pulmonary tuberculosis.

Harelip—A New Surgical Technic

M. COELST M D
BRUSSELS BELGIUM

ARTISTIC as well as surgical anatomy is of the highest importance By operation in many cases we are endeavoring to give the patient features that closely approach those of the normal countenance

When we consider the problem of harelip as a whole, and especially if we analyze the bad results obtained all too frequently by poorly controlled technic we are forced to admit that the harm done by the labial anomaly does not stop at the lip but extends to and includes the base of the ala of the nose not to speak of the fairly frequent occurrence of palatine complications It is not exaggeration therefore to speak of a surgical trilogy in this connection nose lip and palate

Since operation for harelip is a matter of moulding a mass it is absolutely necessary to study not only the plane dimensions height and width but the third dimension thickness which is too seldom mentioned or considered In other words it is not sufficient to restore the lip and the nostril as viewed full face one must also study them from the point of view of profile

With regard to the front view the following points are listed in the order of their importance

1 The philtrum which marks the center of the lip
2 The two columellae at the level of which it is desirable to place the sutures
3 The lower surfaces of the nostrils which should be as well filled out on the operative side as on the normal
4 The alae the bases of which should be restored symmetrically
5 The nasal orifices the contours of which should be of equal length and of normal oval form

When studying the profile particular importance should be attached to

1 The prominence of the upper lip Especially to be avoided are the frightful retractions that are characteristic of an unsuccessful operation for these mark the subject for life A temporary hypercorrection should also be made to prevent the lower lip from jutting out abnormally from the profile at a later date

2 The concavity of the labial profile Only by means of concave curvilinear cutaneous lines can the edges of the skin be so drawn together as to assure the proper outline and the natural grace of the lip

TECHNIC

From the time I first began to use my technic which was conceived in 1937 I have obtained excellent results Although from time to time I have tried standard methods I invariably returned to my personal technic because it gave better results

Line of Incision This line is curvilinear on the internal side and slightly curved on the external side The incision continues cleanly into the pink edge without the necessity of cutting a flap

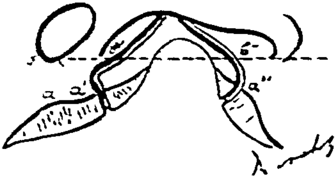


Fig 1. Line of incision.

Suture of the Lining The lining can be made not only from the mucous membrane but from the skin of the edges

Treatment of the Base of the Ala The base of the ala will be detached at its deepest part i e under the [illegible] There will therefore be no cutaneous

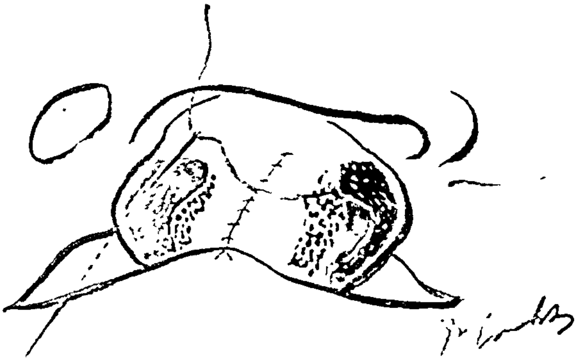


Fig. 2. Exo-endobuccal muscular suture.

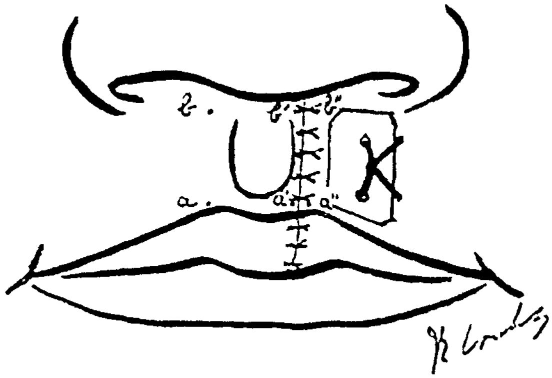


Fig. 5. The end of a single operation.

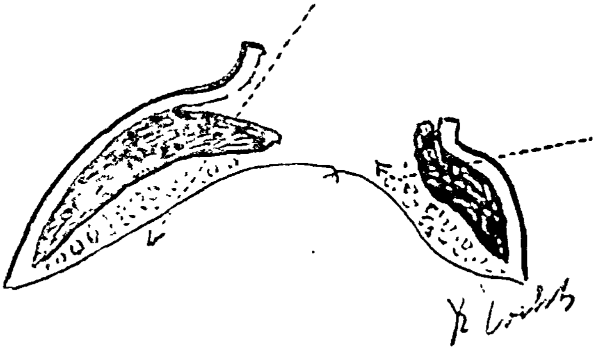


Fig. 3. The U stitch traversing muscles.

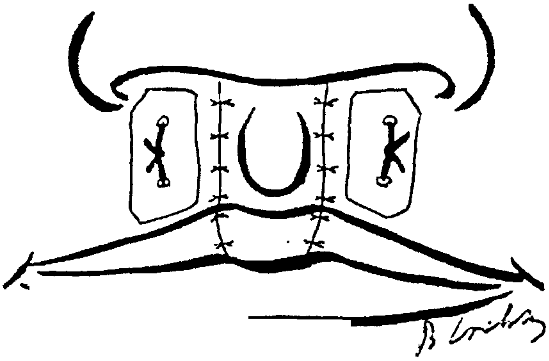
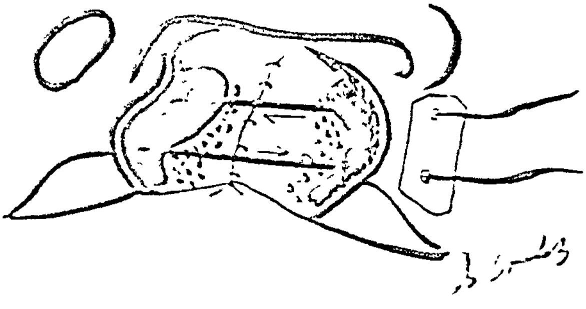


Fig. 6. The end of a double operation.

Exo-endobuccal Muscular Suture: It is known that neither of the two flaps is sufficient in itself to reestablish the relief; together, however, they restore perfectly the plane of the lip. An exo-endobuccal stitch is begun at the external side surface, traversing skin and muscle on that side and then, on the internal side, traversing muscular, glandular and mucous layers to come back to the skin's surface six or seven mm. lower down.



[illegible] the "latch"

Securing of the Latch": The two muscular surfaces, thus prepared, drop one on the other in the manner of a latch. This enables the edges of the skin to be approximated without difficulty. The V stitch will hold the muscular fibers crosswise, something like a rider.

Skin Suture: Suture of the skin is easily performed by means of very small stitches, for no resistance has to be overcome.

The double harelip operation is done in the same way, in one stage. The skin of the median tissue acts as philtrum, and the two sutures are placed where the two columellae should be.

Postoperative Attention: Two-thirds of the fine stitches can be removed from the cutaneous surface on the third day and the remaining third on the fifth day. The U stitch is taken out on the fifteenth day.

Advantages: The advantages of this method are (1) to date, in more than 250 cases in which operation was done by this method, *I have had no case of disunion*, (2) *the proper relief of the upper lip is assured*, and (3) *restoration of the philtrum and the columellae disguises the vertical sutures*

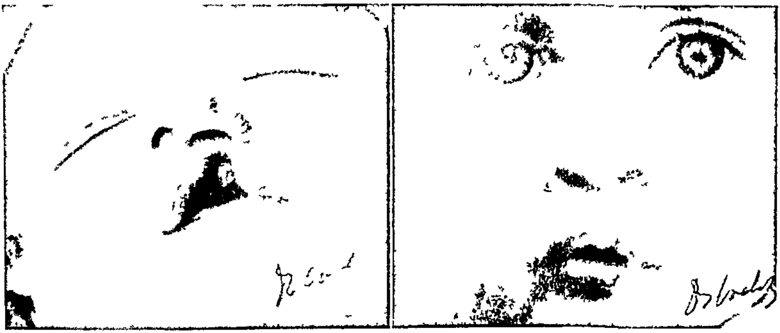


Fig 7a Before Fig 7b After

A result of the author's technic

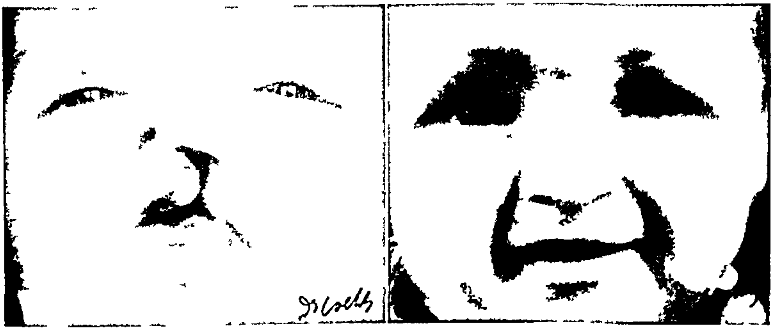
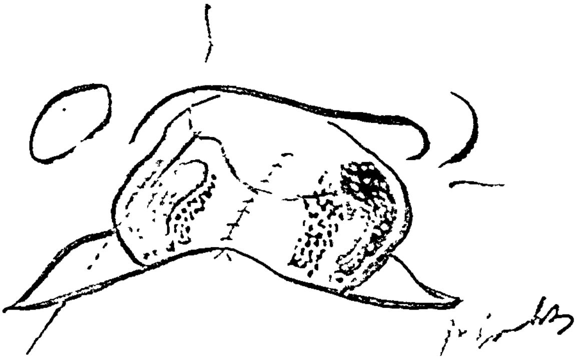


Fig 8a Before Fig 8b After

A result of the author's technic



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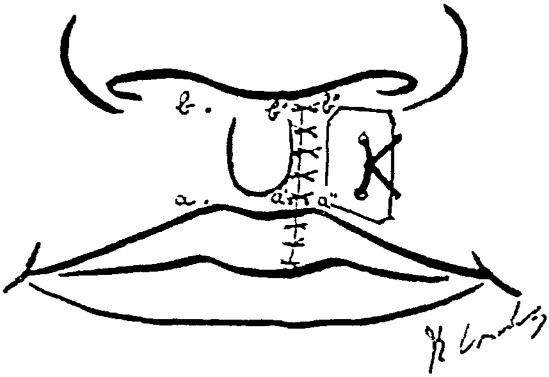

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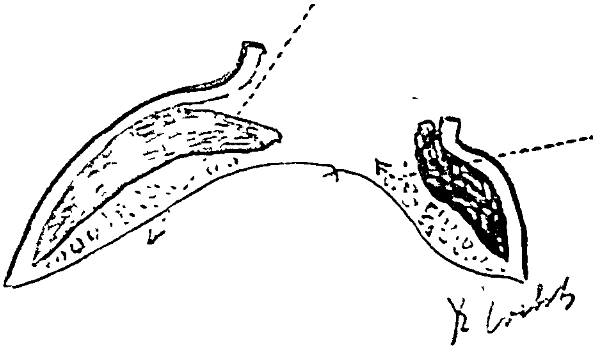

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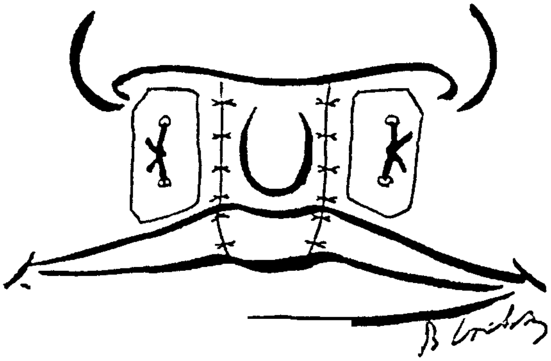

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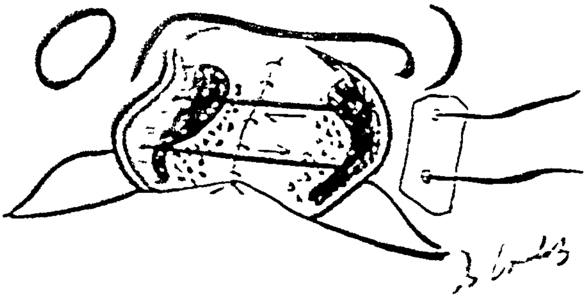

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Advantages: The advantages of this m

Editorials

Potent Medicine

Just how potent is medicine today? In other words, how strong a bulwark is the medical profession prepared to erect against unjustifiable and tyrannical interference by governmental authority with the immemorial relation between physician and patient?

In the October 1949 issue of the Journal of the *Oklahoma State Medical Association* there appeared an editorial entitled "Liberty or Death," containing these lines Our freedom is based upon the gift of reason It is a God given freedom with no controls except the exercise of conscience and any plan for the people's health not based upon the judgment of physicians is an insult to human intelligence Mr Ewing's prescription for the health of the nation is as naively presumptuous as Mother Eddy's obsession that she came to complete the unfinished mission of Jesus Christ"

The disastrous experience of Britain with socialized medicine sounds a timely warning Mr A Lawrence Abel of London speaking before a recent meeting of the American Proctologic Society said things that ought to bring American discussion up to a round turn The American habit—basically a good one—of listening to every man's opinion and giving it at least the benefit of any doubt attached thereto, can perhaps be carried too far when vital issues are involved Too much of the propaganda for socialized medicine here originates in the enthusiastic but uninformed minds of those who have to speak plainly no actual realization whatever of the definite problems involved

The general lay public in any country is easily gulled Mr Abel in his well documented indictment of the system in England admits freely that 'the people love it,' but, he points out, they love it because it makes medical aid available "free gratis for nothing, and have not the faintest realization that it accounts for a great part of the crushing tax burden they bear Servant girls have been known to apply for—and get—as many as a dozen pairs of spectacles on the theory that it is foolish not to get as much as you can of anything you don't have to pay for "The demand for teeth, hearing aids wigs brassieres and spectacles," says Mr Abel wryly "has exceeded the expectations even of those who thought they understood human nature" People cross the Channel from France and other countries to get free appliances free spectacles free radiotherapy, etc in order to avoid paying for these at home, in the first nine months of the system's operation the cost for service to non British applicants was approximately one million dollars

This sounds fantastic, if not actually comic, but there is a substructure of tragedy beneath it As Mr Abel justly points out, "the apparent material benefits cloak the real loss of true medicine True medicine means early diagnosis and early and good treatment" Early and accurate diagnosis on an assembly-line basis is highly improbable, to say the least, and how can treatment be either early or good when the doctor is hampered at every turn by the overpowering load he must carry, *the endless official forms he must fill out,* and the constant frustrations involved in having to devote to political demands and adaptations the time and thought that belong to his profession?

The demoralizing effect of bureaucratic medicine on the general public is sufficiently demonstrated by the exploitations just described There is plenty of good strong evidence throughout history that no man sets much value on what costs him nothing, and, *although bureaucratic medicine* costs him a good deal, the effect is the same if he is not aware of the cost The national economy will also suffer in the final analysis As for the medical profession itself, its dangers can hardly be exaggerated The increased load of work, the ever increasing tangle of red tape, and the regimentation (strongly reminiscent of that necessary in time of war) might perhaps be borne; ours is a durable and much-enduring craft and has proved it times without number. But the damage to medicine itself and, above all, to the time-honored and infinitely valuable personal relation between the doctor and patient can be irreparable; it can mean the ultimate destruction of the art of healing as anything more than a political device.

Already, in Britain, the system imposes nearly insuperable obstacles in the way of a young doctor just going into practice; in some instances he must actually establish residence in a certain locality before he can make application for a post there! As a number of other applicants are sure to be involved, his chances of being compensated in any way for this appalling loss of time and money are small indeed.

The quality of medical care in both clinics and hospitals must decline as a result of the immense cost of "free" service. A ten percent cut in hospital costs was recently ordered by the British Ministry of Health; in one group of hospitals this meant cutting down the patients' food budget by $20,000 a year. As everybody has an equal right to benefits under the system, many sorely needed hospital beds are occupied for long periods by persons with chronic ailments who do not require hospitalization and could be treated quite as well at home.

The medical profession in Ame ica has been
seriously criticized and blam s refusal
to accept such regimentation octors
or patients; but with the co e be-
fore its eyes, surely the mo ita-
tion group must admit th ul
dream is a mirage at best. N -
tainly no physician, denies th
dition of society would require
cellent medical care for every
and child in the world. But we a
living in an ideal society. Patienc
and the slow but effective therapy of
will be needed to cure the world's ch
ness; with regard to radical operati
world must at present be regarded as a
ceedingly poor risk. As Mr. Abel aptly po
out, all great social changes must take place
evolution, not revolution, if they are to tak place without destroying important segments of the social fabric. The concern of physicians about the threat of bureaucratic control has far less to do with personal prestige than the lay public imagines. Doctors are admittedly human and have human ambitions and desires, but there is not one worthy of his title who is not far more concerned about the welfare of his patients and the maintenance of high professional standards than he is about his own aggrandizement. There are too many points of similarity between a sick patient and a sick society to escape the doctor's trained and experienced eye.

Returning to the Oklahoma editorial, we quote: "Regardless of pressure groups and the popular opinion, God help us to say No. We may rest assured that once the bureaucratic rats find a hole they will crawl in, chew up the cheese and leave their offal in the cupboard." Strong language, no doubt. But so was the language of Patrick Henry when he cried, "I know not what course others may take; but as for me, give me liberty or give me death!" The potency of medicine is sometimes in direct proportion to its strength; and the
potency edical profession in defending
the f ir pioneer fathers will be
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Another Milestone

With its January 1950 issue the *Journal of the International College of Surgeons* becomes a monthly publication. Friends, readers and well wishers all over the world have made this advancement possible. Publication of the Journal even on a bi-monthly basis has been more than rewarding, but recognition of its unique contribution as an authoritative periodical devoted not only to surgery but to the creation of world-wide understanding has made the change mandatory.

Contributions of increasing importance to the advancement of surgical science are arriving every day. The shift from a bi-monthly to a monthly basis will enable us to present these fine papers with the punctuality they deserve.

Events of high significance in the scientific and economic status of the world are constantly taking place. Each of them has its relation, often a vital one, to the problems and progress of surgery. From the day of the *Journal's* conception we have regarded it as an important part of our task to interpret the shifting world scene from the surgeon's point of view, to the end that surgeons like all other good citizens of the world may be stimulated to think in terms of international good will and permanent world peace. In addition to our regular editorial columns, the *Journal* now carries a department entitled *New Horizons,* presenting brief editorial comment on matters of international importance.

To our officers, members and subscribers, who cooperated so promptly and cordially in preliminary arrangements for a monthly Journal we take this occasion to express our profound gratitude. To our colleagues all over the world within the College and without it, every issue of the *Journal* is an invitation to share in the fellowship of scientific study on a world-wide basis.

There will be twice as many of these issues now—filled we hope and believe, with more than twice as much value as ever before. The tonic effect of change, of quickened tempo, should stimulate staff and contributors alike to redoubled and highly effective efforts. Let us hope and resolve that the new milestone of 1950 will mark not only the realized dream of a monthly *Journal* but the beginning of a happy half century of progress in both science and human relations.

M. T.

Anesthesiology Essay Competition

The International College of Surgeons announces an award of $250 for the best essay on anesthesiology, to be presented by the Anglo-French Laboratories, Inc. The competition will be held on a world-wide basis and is not restricted to members of the medical profession.

All essays should be addressed to

Anesthesiology Essay Contest, International College of Surgeons
1516 Lake Shore Drive, Chicago

and postmarked not later than March 1, 1950

New Horizons

By the Editor

Consultation with Hippocrates

The celebration of Hippocrates Day on October 23 by the International College of Surgeons, with Dr. Skevos Zervos of Greece as the guest of honor at an afternoon reception and a grand banquet at the Blackstone, was an occasion to be remembered. Dr. Zervos, an internationally known authority in the life and work of Hippocrates, brought with him his outstanding collection of relics and art objects connected with the practice of medicine and surgery in ancient Greece. By proclamation of Mayor Kennelly, the entire week during which these treasures were on display at the College was set aside as Hippocrates Week. Distinguished physicians and surgeons from all over the world participated in the observance, which included the ceremonial planting of a shoot from a plane tree on the island of Cos, under which Hippocrates is said to have lectured his students; the acceptance and dedication of a statue of the ancient master, designed and presented by Dr. Zervos, and the unveiling of thirteen portraits of presidents and past presidents of the College.

Open house was held at the College throughout the week, affording many opportunities for fellowship and new stimuli to achievement. The occasion was typically cosmopolitan, conducted throughout in the spirit of international understanding and professional unity.

Domus Chirurgica

It is with great pleasure and satisfaction that the International College of Surgeons announces the establishment of a new division of the Domus Medica in its Chicago home at 1516 Lake Shore Drive. This new division will be known as the Domus Chirurgica and is under the able direction of Dr. Valentin Charry.

We have long realized the need for a center to which surgeons may come freely at any time for information and guidance in such matters as reunions, conferences and important professional gatherings; for assistance in dealing with the problems of travel, and for postgraduate instruction and recommendation. It has been one of the many dreams of the International College in its plans for establishing a universal surgical fraternity, cooperative in interest and effort throughout the world, and its realization marks an epoch in the organization's progress.

Visiting students and doctors who are taking postgraduate courses will be welcomed to monthly meetings and conferences here. They will be given opportunities to inspect hospitals and research centers. They will be provided with a wealth of information about available cultural advantages of special interest to surgeons.

The travel service to be offered is founded on a thorough knowledge and a comprehensive idea of the traveling surgeon's needs, and will therefore include all possible data about the different nations of the world and what they have to offer in the way of historic interest, folklore and cultural advantages as well as their more definitely scientific aspects. Trips will be arranged in cooperation with established travel agencies. Members of the College will be provided with a booklet of credentials to carry with them, recommending them to the interest and friendship of colleagues and professional institutions in all quarters of the globe. Within a short time it will also be possible for members to obtain microfilm presentations of articles from the current surgical literature.

This is a good beginning, but it is by no means the end. The idea that underlies the

Domus Chirurgica is vital with a seed's vital ty and may be counted on to grow. Already t seems probable that similar centers will ventually be established in most of the principal countries where chapters flourish. Another strong probability is that as time goes on and the services already contemplated go nto the effect, other services will suggest them elves as urgent and will be met. The lusty growth of the International College of Surgeons within a very short time is proof nough that the idea is dynamic and must ultimately prevail in all its manifold implications. At present, any organization based honestly on the desire for universal human welfare commends itself to this troubled and harassed world, when such an organization is based also on that most vital of human concerns the preservation of human life, nothing can long impede its forward striving. In all humility we welcome and acknowledge the sympathetic attitude of the public and of surgeons in general toward the whole enterprise as conceived and carried out thus far, and we hope to make the Domus Chirurgica a fitting reciprocal gift to our brother surgeons.

Words, Words, Words

It is cheering to hear from Dr Walter C Alvarez* of the Mayo Clinic a hearty and sensible echo of the sentiments expressed several months ago by Dr Arnold S Jackson† with regard to the urgent need for shortening and condensing medical articles submitted for publication. We are often reminded not only on reading articles in manuscript but on reading much material actually published of the little boy who was asked to review a juvenile book about penguins. ‘This book,’ wrote the truthful child, “tells me more about penguins than I care to know.”

Both Dr Jackson and Dr Alvarez rightly condemn long drawn out introductions, unnecessarily detailed reviews of the literature (except in papers written specifically as reviews), the padding of articles with rehashed material from other authors' pages and the endless piling of words upon words in a sentence that would be better constructed at half its length. Both point out that so many medical journals are now available that the busy physician or surgeon cannot possibly keep up with them all, and it is a great pity that his honest efforts to do so should be further impeded by torrent after torrent of useless verbiage. Moreover the authors themselves would profit by condensation because the time of waiting for publication would be immensely shortened. ‘Most medical and surgical journals,’ says Dr Jackson, ‘have such a tremendous backlog of articles on hand that it will be months and perhaps years before some of these articles appear.” Obviously, many articles lose their value if publication is too long suspended.

Old habits are hard to break, but they can be broken. We can think of no better aid to composition than Dr Morris Fishbein's incomparable handbook Medical Writing‡, the second edition of which is now on the market. The reader will be entertained as well as instructed by some of the “horrible examples” in the chapter on style, e g, “Medulloblastomas develop almost invariably in children taking their origin just over the fourth ventricle.”

A little study of the basic principles of good writing would enable contributors to present their facts in compact, readable and significant form, to include what is necessary in the way of bibliographic references and allusions to the literature, and to leave out the rest. It is to be hoped that other distinguished voices will be added to those of Dr Jackson and Dr Alvarez, and that the resulting chorus will eventually drown out the frenetic stutter of typewriters “on the loose.” That dread disease, cacoethes scribendi, has long been recognized as incurable, but the prognosis can be improved so far as interest and value are concerned.

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*Proc Staff Meet Mayo Clin 24 442 (Aug 17) 1949
†Am J Surg 77 543 (May) 1949

‡Philadelphia The Blakiston Company, 1949

News Notes

Dutch and Indonesian Tropical Medicine Journal Formulated

Recognizing that medical articles published in Dutch are intelligible to a comparatively small number of readers and that the mother tongue of Indonesia—the Bahasa Indonesia—is still more restricted, a foundation with headquarters in Amsterdam has launched a new quarterly journal of tropical medicine in English-Documenta Neerlandica et Indonesica de Morbis Tropicis, according to the *Lancet.* The editors of Documenta hope that much of the work done in Surinam and the Netherlands Antilles, as well as in Indonesia, will eventually be recorded in their journal. The annual subscription may be obtained from F.K.A.A. Lambrecht, 268, Rivierenlaan, Amsterdam Z, Netherlands.

Chicago Cancer Research Hospital

The Nathan Goldblatt Memorial Hospital at the University of Chicago has begun construction as the first unit in the University's $8,500,000 Cancer Research Center. The building cost will amount to $2,075,000.

Projects Allocated by the National Foundation for Infantile Paralysis

Funds allocated for research and educational projects by the National Foundation for Infantile Paralysis for 1949 now total $2,565,159, with additional grants to be made later in the year. The greater share of the funds will be devoted to research including one sum of $1,370,160 allotted for a three-year, coordinated effort at four universities to determine the number and characteristics of polio viruses which can produce human diseases. The four universities are: University of Southern California, University of Kansas, University of Utah, and the University of Pittsburgh.

Connecticut Has First Hospital for Alcoholics

Construction of the first hospital in the United States devoted solely to the study, treatment and rehabilitation of alcoholics has been started in Hartford, Conn. Funds totaling $551,943 are available for this purpose and the new project will be under the direction of the Connecticut Commission on Alcoholism. The Commission will operate the building and organize and supervise its services. [illegible] fireproof building will cost $423,700 and will be located on Coventry Street near the present McCook Memorial hospital. The Connecticut Commission on Alcoholism is headed by Dr. Selden H. Bacon, associate professor of sociology at Yale University.

International Congress on Cancer

The fifth International Congress for Scientific Research and the Social Fight Against Cancer is to be held at the Sorbonne in Paris July 17-22, 1950. The Congress is open and those who wish to become affiliated with the union should address Prof. V. LeLorier, Secretary-General of the Congress, 6 Avenue Marceau, Paris 8, France.

Journal Exchange

Arrangements have been completed for a regular exchange of journals between this office and that of the *Dutch Archives of Surgery.* This European journal, which will publish most of the articles in English, should provide a valuable link between surgical specialists in two continents.

Inauguration of Brazilian Chapter

The inauguration of the Brazilian Chapter of the International College of Surgeons was held on the evening of September 30, 1949, in the auditorium of the Public Library in Sao Paulo, with Dr. Pedro Calmon, Dean of the University of Brazil, Rio de Janeiro, presiding. Prof. Carlos Gama, president of the new chapter, addressed the assembly.

American Association of Blood Banks Has Second Annual Meeting

The second annual meeting of this organization was held at the Olympic Hotel, Seattle, Washington, Nov. 3-5, 1949. A varied program, covering both technical and administrative aspects of the work and implemented by exhibits, was present.

The 16th International Congress of Ophthalmology

The 16th Congress of Ophthalmology will be held in London on July 17, 1950, Dr. Stewart Duke Elder presiding. The official languages of the Congress will be English, French, and Spanish. Two principal topics will be discussed: (a) the Sympathetic System in the Genesis of Vascular Hypertension and Its Effect on the Eye, (b) the Clinical and Social Aspects on Heredity in Ophthalmology.

Those interested in the Congress may contact Mr. Keith Lyle, Office of the International Congress of Ophthalmology, 45 Lincoln's Inn Fields, London, W. C. 2.

New Books

Operative Technic By Warren H Cole New York Appleton Century Crofts, 1949

This new book is a handsome and comprehensive text on general surgical technic Its author editor Dr Warren H Cole, presents the work of more than thirty distinguished specialists in addition to his own Dr Frank H Lahey writing the introduction, points out the constant need of modernization in such textbooks to keep pace with the rapid advancement of surgical knowledge and skill Research, new diagnostic methods, and the decision for or against operative intervention in the given case are the main areas of emphasis, aside from the detailed presentation of technics

As the work of specialists in nearly three dozen fields, *Operative Technic* has a peculiar value for specialists and general surgeons alike To the specialist it offers stimulation to new refinements of technic, to the general surgeon it provides ready and dependable aid in solving problems that lie more or less outside his daily routine

The book contains more than five hundred illustrations, including some fine color plates There are twenty three chapters each dealing exhaustively and clearly with the surgery of a different part of the body There are 939 pages of text supplemented by a well organized index The make up is unusually distinctive Coming as it does from authoritative sources second to none in the field of surgery, the book should be welcomed and valued by a wide reading audience throughout the world

The Autobiography of Benjamin Rush Edited by George W Corner Published for the American Philosophical Society by Princeton University Press, 1948

It is altogether fitting that the life story of Benjamin Rush should appear under the auspices of a philosophical organization As with all great figures in any field of endeavor, the observations and experiences of a man of medical genius carry with them more than appears on the surface, there is always a strong undercurrent of *human feeling*, emotional excursion and philosophic implications

Rush wrote his autobiography under the general title "Travels Through Life," which in itself is an indication that he was aware of these deeper meanings, and supplemented it with his "Commonplace Book," *a sort of journal in* which he preserved such of his experiences and impressions as had intrinsic general interest Both are included in this well edited volume, together with innumerable foot notes relating the facts to leading personalities of the day Every page therefore, is replete with historical as well as medical and philosophic interest

Few changes have been made most of the material in both parts being reproduced word for word as Rush wrote it In a few instances Rush himself had indicated deletions which he apparently intended to make

The book is so crowded with anecdotes that it is impossible to give an adequate impression of it in a brief review From the Commonplace Book a few random excerpts will perhaps best convey the general nature of the man as revealed by his recorded thoughts It includes a set of heads for a lecture on the origin of evil, in which apologizing for a slight digression, Rush amusingly admits that he has been accused of polygamy in his studies "But," he adds quaintly, "unlike a plurality of wives, my studies all agree ' On Aug 26 1797 there appears the following note 'This day gave two Dollars to the keeper of the new Jail to buy watermelons for the prisoners" On Sept 17, 1801 Died my old and once valued pupil, Dr Hall There is no other comment doubteless on the principle "De mortuis nil nisi bonum"? Rush is not always so indulgent in 1804 he records another death "Died aged 81 Ed Stiles worth near 200,000 pounds, a poor ignorant avaricious creature He seldom paid a debt without being sued for it, Even his taxes were extorted from him by law"

This book is a treasure for the reader A more colorful personality has seldom graced the biographical scene, and both the immortal Rush himself and his devoted editor deserve our lasting gratitude

Handbook of Anatomy By George W Miller Ed 9 Philadelphia, F A Davis Company, 1948

Dr Miller's small classic of practical anatomic information has long been the medical student's standby *Dental students, nurses and artists have* also found it useful, as its many editions testify A new edition, the ninth, now appears with notable improvements, especially in the illustrations

In addition to a systematic outline of the anatomy of every part of the body, there is a chapter on surgical anatomy and *one on dental anatomy* The book's physical makeup as well as its content has been revised, and to excell

Abstract from Current Literature

The Fallacy of the So-Called Thyroid Capsule. Philip Thorek. Am. J. Surg. 78: 133-138 (July) 1949.

No great experience is needed to convince any practicing surgeon that the so-called thyroid capsule, considered as a well-defined structure completely encircling the gland, does not exist. The thyroid is surrounded by fasciae that form a sheath of areolar tissue with definite points of attachment to the gland itself, and specific planes of cleavage exist therein. If the surgeon is thoroughly familiar with the anatomy of the region he can make good use of these cleavage planes in approaching the gland; but there is no justification, either surgical or morphologic, for the idea that the thyroid can be enucleated merely by incising the sheath.

The anatomic arrangement of the cervical fascia has been presented by many anatomists in as many versions, and a certain amount of confusion has resulted. It may be well to indicate here the results of ten years' research and observations at the operating table, dissection and autopsy, any of which can be verified by observation of the living patient. First, however, it is important to clarify certain general principles of fascial arrangement (Fig. 1A) in order that the normal planes of cleavage may not be mistaken for artifacts. Most skeletal muscles, except those which lie upon bone, cartilage, etc., are surrounded by fascial envelopes of tremendous variation in strength; in some instances there is a strong closed investment like a dense sheath, in others there is only a thin layer. When one muscle overlies another, the layer of fascia between them is common to both; according to Meyers and Macpherson this fact is highly important, though too often overlooked. For the purposes of this article its importance is extreme, because the fascia associated with the deep surface of the sternothyroid muscle bears such an intimate relation to the anterior lamella of the pretracheal fossa that in some instances they become fused and are considered and incised as a single structure.

It must be borne in mind that fascia is a living structure, with its own specific responses to stimuli. It is therefore to be included among other structures for accurate identification in a well-planned thyroidectomy.

The fascia colli, or deep cervical fascia (Fig. 1B) may be discussed under these subheadings: (1) the general investing layer, (2) the pretracheal (middle) layer, and (3) the prevertebral (deep) layer. These layers may fuse at the midline, the degree of fusion depending on the divergence of the infrahyoid muscles and on the number and disposition of the anterior jugular veins, which course between the fasciae of the sternomastoid and the sternohyoid muscles.

General Investing Layer: This (the superficial layer) is notable for its capacity of splitting and thus enveloping muscles (the trapezius and the sternomastoid). Attached posteriorly to the ligamentum nuchae, it splits at once to envelop the trapezius, at the anterior border of which it reunites, forming the fascial roof of the posterior triangle of the neck. At the posterior border of the sternomastoid it splits again, forming an investment for this muscle also. Again the two layers, reuniting, proceed forward to form the roof of the anterior triangle, becoming continuous with a similar layer on the other side. Above, this layer of fascia is attached to the external occipital protruberance, the superior nuchal line, the base of the mastoid process, the zygomatic arch and the lower border of the mandible. Below, its attachments are to the manubrium sterni, the clavicle, the spine of the scapula and the acromion process. Thus it assumes the form of a circular tube that maintains the structures of the neck in their several places.

Pretracheal Layer: The pretracheal, or middle, layer is the most important of the three from a surgical point of view. It occupies the same place as the sternohyoid and omohyoid muscles; the sternothyroid occupies the plane immediately subjacent. The pretracheal fascia, accordingly, invests the sternohyoid and omohyoid muscles, forms a cleavage plane of loose areolar tissue below them and then becomes a fascial sheath or envelope for the deeper-lying sternothyroid muscle. The areolar tissue lying on the deep surface of the sternothyroid muscle is closely related to the lamella of pretracheal fascia that forms the anterior part of the sheath which encloses the thyroid. This arrangement permits surgical use of the normal planes of cleavage in mobilizing the gland. It also proves, obviously, that no single separate capsule encloses the thyroid.

Having identified the sternothyroid muscle and dissected at a point posterior to it, the surgeon automatically breaks through the sheath and exposes the thyroid gland; but, even though he has made the incision at the proper plane of cleavage, he will find that he cannot mobilize the thyroid lobe completely; the lateral attachments of the pretracheal fascia will prevent him. This can best be de-

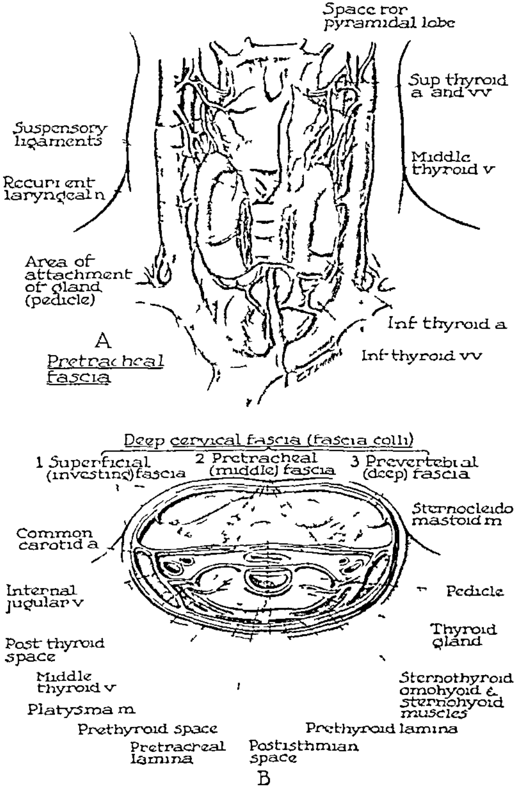

Fig 1 A the suspensory ligaments of the thyroid gland shown passing from the inner margins of the gland to the cartilaginous framework The relation of the vessels and the recurrent laryngeal nerve to the pretracheal fascia is also shown *B* Cross section of the deep cervical fascia (fascia colli) Three layers are apparent the superficial (investing), the middle (pretracheal) and the deep (prevertebral) The important prethyroid and post thyroid spaces are shown in relation to the middle thyroid vein

scribed if the pretracheal layer of deep cervical fascia is considered as an offshoot of the general investing layer, passing horizontally in front of the carotid system and as it continues in a medial direction, splitting into two layers (Fig 2B) a prethyroid layer and a pretracheal layer proper The prethyroid layer is a thin anterior lamina extending medially, and loosely attached to the gland along an irregular line at the juncture of *the middle and posterior thirds of the surface* of the lateral lobe At the upper pole its course is medial, anterior to the superior thyroid ves sels; toward the midline it becomes firmly reunited with the pretracheal layer proper. Another division takes place at the lateral margin of the pyramidal lobe, the prethyroid layer reappearing to extend over the anterior surface of the pyramidal lobe and unite with the pretracheal layer on the opposite side. Below, the line at which the prethyroid fascia is attached to the gland extends around the lower pole and across the inferior margin of the isthmus, where it supplies an anterior envelope for the inferior thyroid veins. Lateral to the gland, this layer is divided from the pretracheal layer proper by a triangular space filled with loose connective tissue (post-thyroid space), whose sides are formed by the prethyroid fascia anteriorly, the pretracheal fascia proper posteriorly and the thyroid gland medially (Fig. 1B). It extends along the posterolateral border of each lateral lobe from the superior thyroid vessels to the lower pole.

The pretracheal layer proper passes medially behind the thyroid lobe, the lateral border of the esophagus and the trachea, where it thickens to form the pedicle of the thyroid gland. Although

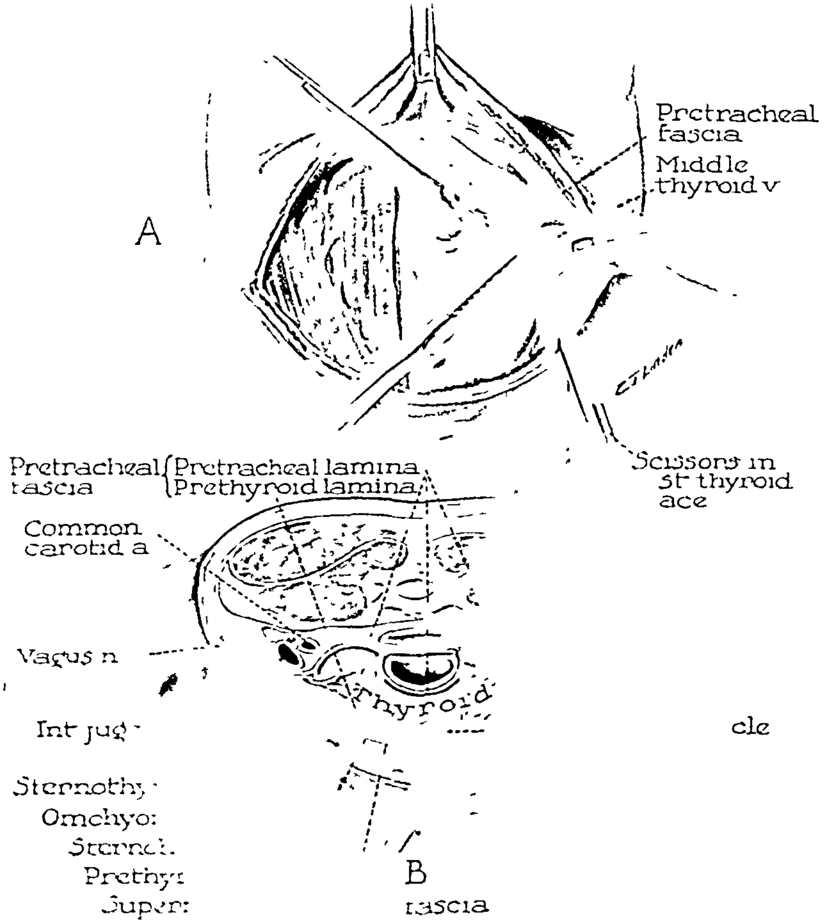

Fig. 2. A, the m   red and l
the pretracheal fas   bles the
thyroid space and n   in the
gram showing the tw   nd p
pretracheal fascia. To   spac
middle thyroid vein div   post-
thyroid space is entered   of
posterior surface of the s   e
the sheath of the gland;
The post thyroid space is
thyroid vein and incision of
to the lateral border of the th

these posterior and anterior layers of fascia do form a sheath, it is one with several attachments to the gland, which must be clearly understood if the gland is to be mobilized properly No cleavage plane exists in the region of the pedicle, the attachment here being firm Extending medially from the pedicle over the trachea and the larynx to join the same layer from the other side, some of its posterior fibers blend with the buccopharyngeal fascia Areolar tissue separates the fascia anterior to the pedicle, so that a definite plane of cleavage is to be found just behind the thyroid isthmus and the pyramidal lobe

The two suspensory ligaments, right and left of the thyroid gland (Fig. 1A) represent thickened portions of the pretracheal fascia passing from the inner margins of the 'gland to the cartilaginous framework These ligaments anchor the gland to the larynx in a sort of sling, and the gland cannot be properly mobilized unless they are severed

Between the layers of the pretracheal fascia are the vessels entering the gland and leaving it (Fig 1A). The superior thyroid vessels run between the pretracheal and the prethyroid laminae, the inferior thyroid artery, emerging from behind the sheath of the carotid, penetrates the pretracheal fascia in its posterior aspect and passes medially to the thyroid pedicle, where it divides into two or more branches The inferior thyroid veins and the ima vessels are located inferiorly between these two layers of fascia Because the parathyroids, the external and recurrent laryngeal nerves and the thymus gland lie in different morphologic planes from the thyroid, they are outside the fascial investments of the thyroid gland proper In the prethyroid fascia the middle thyroid vein is of greatest surgical importance This vessel usually leaves the gland at about its middle, following the inferior border of the omohyoid muscle across the carotid artery and ending in the internal jugular vein

Vertically, the pretracheal layer of deep cervical fascia extends from the hyoid bone above to the fibrous pericardium over the great vessels in the superior mediastinum below, blending with the latter This layer forms a sheet or plate in front of the larynx and carotid system, in contradistinction to the tubelike circular investment formed by the superficial layer

Prevertebral Layer This layer has no practical importance in thyroid surgery Horizontally placed, it is an offshoot of the deep surface of the sternomastoid muscle, it passes behind the carotid system, pharynx and esophagus, but in front of the prevertebral muscles and vertebrae It extends vertically from the base of the skull to the posterior wall of the superior mediastinum

SURGICAL CONSIDERATIONS

Successful thyroidectomy depends upon two prerequisites proper exposure and proper mobilization of the gland Certain steps in the operative procedure, therefore, must be emphasized The sternothyroid muscle, key structure in locating the "prethyroid space," must be identified A natural cleavage plane exists between the sternohyoid and the more deeply placed sternothyroid muscle On entering this space, the sternohyoid muscle can be either retracted or transversely severed at a high level, thus avoiding its nerve supply The sternothyroid is identified, exposed and retracted or transversely severed This maneuver incises the prethyroid lamina of the pretracheal fascia which surrounds this muscle, and the prethyroid space is entered Even then, however, the gland cannot be mobilized, owing to the lateral attachment of the pretracheal fascia to the lobe

To enter the post thyroid space it is necessary to separate the prethyroid fascia from the lateral surface of the lateral lobe of the thyroid This fascia contains the middle thyroid vein, which must be identified, severed and ligated, thus establishing a communication between the prethyroid and the post thyroid spaces (Fig 2A) Having entered the post thyroid space, the surgeon will be able to mobilize the gland and to identify with ease its posterior attachments by its true pedicle

In Memoriam

DANIEL BENJAMIN MARK

M.D., A.I.C.S.

Dr. Daniel Benjamin Mark of Minneapolis, Minn., recently passed away at the age of 61. He received his medical education at the University of St. Louis, graduating in 1909, and then he did postgraduate studies at the University of Minnesota and at the New York Polyclinic Institute. Dr. Mark was a member of the American Medical Association, the Minnesota State and County Medical Societies, and the American College of Physicians and Surgeons.

GEORGE D. J. GRIFFIN

M.D., F.A.C.S., F.I.C.S.

Dr. George D. J. Griffin, president of the medical staff, Mercy Hospital, Chicago, and noted surgeon, died on his 62d birthday, March 27, 1949. He established medical fame early in association with Dr. John B. Murphy, and in World War I, he headed one of the A.E.F. principal medical centers in France. Dr. Griffin, born in Chicago, was graduated from Northwestern university medical school and interned at Mercy Hospital.

In World War I, he served as senior surgeon at Base hospital 72, Mesves, France, and chief of surgical service, Camp hospital 114, Ecommoy, France.

Since 1919, Dr. Griffin had been on the faculty of Loyola university medical school. At his death, he was clinical professor of surgery there, senior attending surgeon at Mercy Hospital, and also staff president and chairman of the hospital's executive committee. Dr. Griffin was an active member of the American Medical Society, Chicago Medical Society and the Illinois State Medical Society.

O. CHARLES ERICKSEN

M.D., F.A.C.S., F.I.C.S.

On July 30, 1949, Dr. O. Charles Ericksen, Sioux Falls, S. D., died at the age of 53. Dr. Ericksen received his M.D. at Rush Medical College, University of Chicago in 1920. He served his hospital internship at Mount Sinai hospital, and the St. Francis hospital, Chicago. From 1923 to the time of his death he was affiliated with the Sioux Valley hospital and with the McKennan hospital, Sioux Falls, S. D. Dr. Ericksen was a member of the Seventh District Medical Society, South Dakota Medical Association, American Medical Association, and the Cook County Interne Society, Chicago.

HARRY H.. EVERETT

M.D., F.A.C.S., F.I.C.S.

The International College of Surgeons, as well as the entire medical profession, mourn the loss of one of its most honored members in the passing of Dr. Harry H. Everett, of Lincoln, Nebr. Dr. Everett, 73 years old, was a graduate of the University of Nebraska in the class of 1897, and continued his studies at Northwestern university where he received his master's degree. He took his postgraduate work at Johns Hopkins University School of Medicine and then went abroad to complete his medical education at the University of Vienna, Austria and the University of Jena, Germany.

Upon his return, Dr. Everett made his home in Lincoln, where he began his varied and excellent career. He was first associated with his father and two brothers at the Lincoln Sanitarium where he served as chief surgeon. Dr. Henry was an instructor at the University of Nebraska, attending surgeon for many years at the Bryan Memorial hospital and St. Elizabeth hospital, and chief of staff of the Lincoln General hospital. .

LEWIS FREDERIC SMEAD

M.D., F.A.C.S., F.I.C.S.

The Chief of Staff of the Toledo Hospital, Ohio, Dr. Lewis F. Smead, passed away July 28, 1949. Dr. Smead, aged 70, attended Johns Hopkins University School of Medicine, received his degree in 1905, and interned for two and a half years at the Union Memorial hospital, Baltimore. He formerly was a member of the staff of Flower Hospital, and Women's and Children's Hospital and St. Vincent's Hospital, Toledo, O. At the time of his death, he was director of the surgical division staff of the Toledo Hospital.

Dr. Smead made outstanding contributions to the societies in which he held membership, such as the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, and as a member of the Founders Group of the American Board of Surgery.

THE JOURNAL OF THE INTERNATIONAL COLLEGE OF SURGEONS

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